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CLEARLAKE GENERAL PLAN

Technical Background Papers

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CLEARLAKE GENERAL PLAN

TECHNICAL BACKGROUND PAPERS

CITY OF CLEARLAKE
June 1983

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INTRODUCTION
TO
TECHNICAL BACKGROUND PAPERS

In the course of developing the initial draft of the Clearlake General Plan/Policies and Programs, which was published in November 1982, the General Plan consultants undertook a research program to describe key features of the natural and human environment of the city and to identify problems and opportunities that a city-focused planning effort might address.

This research, which delved into documents and published statistics and included considerable field work, complemented the effort under way between May and December 1982 to ascertain community views on important local land-related questions. Public input was sought at three public workshops and numerous public meetings before the Planning Commission and City Council, and public suggestions and comments represent the other half of the effort that went into framing policies and programs relevant both to Clearlake's physical and economic situation and to its residents' objectives and priorities for the community.

The research completed for the General Plan is presented in this volume organized in three main sections: Environmental Resources, Environmental Constraints, and Urban Systems and Services. The investigations culminating in the 15 Technical Background papers presented here were conducted during the summer of 1982, with first drafts completed in the fall. The reader should keep in mind that the information presented in the papers was current as of mid-1982. Exceptions are the papers on land use and on housing, which were drafted in fall 1982 and updated in spring 1983 in response to state agency comments.

Each of the three main sections is footnoted separately, with all footnotes appearing at the end of the text (beginning p. 95). Persons contacted are also listed, beginning at p. 104. Maps referred to in the text appear at the end of the document.

ENVIRONMENTAL RESOURCES

WATERS

Clear Lake

Several agencies regulate the lake and its shoreline. Submerged lands are managed by the county (all lands 7.56 or below on the Rumsey gauge). The city limits go to zero on the Rumsey gauge. However, a California Supreme Court decision after incorporation placed all privately owned land between the low and high water marks (zero and 7.56) into the public trust. The ruling states that the public has rights up to the high water mark; property owners may utilize their land in any manner compatible with the public trust. While the city regulates development along its shoreline to the low water mark, the county also comments on development permits at or below the high water mark.¹ The area between the high and low water marks is therefore the interest of both the city and the county.

The Yolo County Water Conservation and Flood Control District operates the lake's reservoir (which is between the high and low water marks). The U.S. Army Corps of Engineers regulates the development of all fill projects occurring below the high water mark. The State Dept. of Fish and Game provides the state's viewpoint on fish and wildlife matters when reviewing permit applications and environmental documents.²

Most of the lake shore in Clearlake is in private ownership. With the exception of two county-owned parks, the predominant use is residential. Numerous private boat docks occur in conjunction with the residential use.

Clear Lake is the largest natural freshwater lake lying wholly within California. Four sources of water replenish the lake: direct precipitation, runoff from indirect precipitation, subsurface inflow from groundwater, and irrigation return flow. The outlet from the lake is the headwaters of Cache Creek. The impounding dam constructed in 1915 by the Yolo Water and Power Company controls the outflow.³

Clearlake is adjacent to the lower arm of the lake, which has an average depth of 33.8 feet. The north end of this arm is deepest; its bottom slopes toward the shallow outlet at Cache Creek. The Burns Valley area shoreline is an alluvial plain which provided space for the City of Clearlake to develop.⁴

The economic and aesthetic values of Clear Lake are directly affected by the lake's water quality. The major water quality problem results from excess planktonic blue-green algae growth which occurs in the spring and fall and is most prominent in the Oaks and Lower arms. Natural conditions contributing to algae growth include warm water temperature, good sunlight penetration, and an ample supply of nutrients. The lake's high natural fertility results in both beneficial fish crops and detrimental overproduction of the Clear Lake gnat and blue-green algae. The algae forms large visible scums on the lake surface, creating unsightly patches

and odor problems along the shore. Extensive research has been conducted but a great deal of money and effort would be required to implement algae control methods.⁵ Strong winds can mix the lake water, pushing algae deeper into the water and alleviating the problem.⁶

Borax Lake

Borax Lake is located in the northwest end of Clearlake, within a small valley. The lake is at 1,330 feet in elevation, with Sulphur Bank Ridge 600 feet above. A large number of ephemeral streams drain into the lake. Water level changes are closely correlated with seasonal precipitation. Evaporation and presumably ground seepage play a large role in reducing the level of the lake each year, since there is no surface outflow. Because there is no surface water outflow, alteration of the physical and chemical water balance of this unique lake would undoubtedly lead to changes in the biota.⁷

Like other saline lakes, Borax Lake's high alkalinity and high boron concentration (one of the highest in the world) have imposed limitations on the diversity of flora and fauna. Total number of species is low, while quantitative abundance can be high, depending on the organism. This is graphically shown during the summer months when insect swarms and decay of aquatic vegetation along the receding shoreline are evident. No native fish can tolerate the lake's water.⁸

Though Borax Lake and the surrounding area are privately owned, illegal, informal recreational use of the property has historically occurred. Some of this has been very detrimental to the natural environment: off-road vehicles have caused soil erosion, trees have been cut down, target shooting harasses waterfowl, and garbage has been dumped.⁹

Other Surface Waters

Clearlake has two principal streams tributary to Clear lake, Burns Valley Creek and Molesworth Creek (see Figure 2). There are also smaller drainage areas with poorly defined stream beds which drain directly into the lake. Miller Creek is one of these; it functions as the Burns Valley Creek overflow. Alvita Creek, which has very little capacity, drains into the lower reach of Miller Creek.¹⁰ These creeks all have intermittent flows during and following the wet season, providing important habitat for fish and wildlife as well as facilitating storm drainage.

Cache Creek is a perennial stream and is the principal outlet for Clear Lake. In 1915, the Yolo County Water and Power built an impounding dam across the Cache Creek outlet to capture water to be used for irrigation in Yolo County. The dam is located beyond the city's southerly boundary which is formed by Cache Creek. Most of Cache Creek within the city limits has been dotted with residential and water-related development (e.g. the Highlands Harbor subdivision). A vineyard, sloping undeveloped hillsides and small alluvial plains define the upper reaches of the creek's northern banks.

Surface Water Quality

The Clear Lake gnat has been a nuisance around the lake for many decades. The gnat is a small, non-biting but prolific insect, found in great numbers around the lake. The gnats are principally a nuisance at night when they swarm around lights. Male gnats form gnat mating swarms in the evening, attracting females who deposit eggs on buildings and vehicles causing extensive damage.¹¹ Gnat levels increased slightly in 1980 but, since levels are still considerably below 1975 levels, Mosquito Abatement District officials are not yet concerned.¹² It is suspected that the introduction of the Mississippi silverside may be responsible for reduced gnat counts.

Mosquitos are another water-related problem in Clearlake. Anderson Marsh and Clearlake's intermittent streams, particularly Burns Valley Creek, are areas of mosquito production. Mosquitos breed in stagnant water from May to July.¹³ Burns Valley Creek has been used as an informal dump site, obstructing the flow of water. The treehold mosquito is responsible for many of the city's mosquito problems. Most bothersome in the springtime, it readily bites humans and occasionally transmits the dog heartworm. The problem can be greatly reduced by filling all treeholes within 100 yards of residences with pea gravel, sand, or concrete.¹⁴

Borax Lake is the Mosquito Abatement District's biggest problem because of the black biting gnat prevalent there. They attack man and warm-blooded animals. Bites cause itching, and welts and lesions in sensitive individuals. The gnats are also vectors of several diseases of cattle, sheep and horses. More than the gnats, however, the odor of Borax Lake has been a deterrent to development.¹⁵

SUBSURFACE RESOURCES

Groundwater

Groundwater is contained in underground formations called aquifers which, in the case of Lake County, are composed of either volcanic materials or alluvial materials such as sand and gravel. Water stored in aquifers surfaces through wells and springs or by seepage into lakes, streams and wetlands. Groundwater is replenished from the surface: surface water from streams seeps into aquifers or precipitation percolates directly into aquifers. Aquifers moderate surface flow by absorbing water during rains and gradually releasing it during dryer periods.¹⁶

The amount of water that enters an aquifer determines the amount of water that can be withdrawn without severely depleting the reservoir. In Clearlake, most water for domestic use is supplied by several water companies, which rely on water from Clear Lake for their supply. Groundwater for agriculture and landscaping irrigation is the primary use of Clearlake's groundwater.¹⁷ Most of Clearlake's agricultural crops are not irrigated, however, because most wells drilled in the area are undependable and the condition of the walnut orchards does not justify the cost of a well and irrigation system.¹⁸

Clearlake is located within the Lower Lake Hydrologic Unit. Within that, the two square mile Burns Valley Groundwater Basin has a storage capacity of 1,400 acre-feet. The general direction of groundwater movement is toward Clear Lake. Principal waterbearing deposits are alluvium and Cache formation and recharge is essentially all from rainfall within the drainage area (12.5 sq. mi.). The Borax Lake Basin's waterbearing deposit is the alluvium around the lake, with recharge from the drainage from the surrounding hills. Wells close to the lake would probably yield water of high boron content.¹⁹

The Regional Water Quality Control Board has been attempting to correct a violation at the Eastlake Landfill. Lake County has been under an administrative violation since March 1981. High concentrations of lead have been measured at wells below the landfill site, and springwater is running off from the landfill into Molesworth Creek. Encon Associates have been hired to correct the situation.²⁰ Any leachate into Molesworth Creek is a serious problem because three water treatment facilities are located near the creek.²¹

According to Encon, the lead concentrations in the wells are probably the result of the sampling method used and do not relate to the leachate from the landfill. The second issue - spring seepage - can be corrected by some form of treatment on the landfill site to dispose of water onsite, or to connect to a sewer system (or some combination of both).²²

Geothermal Energy

The City of Clearlake is located within the Geysers-Calistoga Known Geothermal Resource Area (KGRA). Most of the current geothermal activity occurs in the Mayacamas Mountains near the Lake - Sonoma County border, however. The facilities there are the world's largest geothermal electric generating complex. Lands lying northeast of Clear Lake in the KGRA have been partially leased for potential development. The geothermal steam rights are treated as mineral resources which can be leased. It is not publicly known the extent to which private lands have been leased for this purpose.²³

In addition to the use of geothermal resources for electrical power generation, geothermal energy can be directly used by utilizing geothermal water without first converting it to electricity. Interest in direct use applications is growing due to increased energy costs for other forms of energy and the development of direct use technology. Space heating, agricultural operations, and greenhouses are potential direct use applications in Clearlake.²⁴ Greenhouse applications would also be beneficial because of the number of jobs that would be created.

The Dumont property at Borax Lake has a lease agreement with Phillips Petroleum for developing geothermal energy. One geothermal well exists on the site and several more could be developed. The existing exploratory well was drilled 7,000 feet in 1978 and found 400 F water at a 200-foot depth. The well was capped. Mixed residential, resort and vineyard development has been proposed for the property, which may include greenhouses heated by geothermal energy. Another option would emphasize commercial geothermal resource development.²⁵ To date, no other areas in Clearlake have been identified as having a geothermal potential.

Minerals

There is one surface mining activity in Clearlake. The Reid rock quarry (currently inactive) is located in Clearlake Park (at the SE corner of section 16, Township 13N, Range 7W). Several operations mine gravel out of Cache Creek downstream of Clearlake.²⁶ Beyond Clearlake, in the extreme southern portion of the county, Homestake Mining Company is developing the McLaughlin Project gold mine, which may have impacts on Clearlake residents and services.

Borax Lake is unique in many respects, including its minerals. The California State Division of Mines and Geology provides the following description of minerals within Lake County:

Borax Lake and Sulfur Bank in Lake County are two of the most famous mineral collecting areas in the state. Known to be mineralized since the gold rush days, the two areas have yielded unique and new minerals, as well as several rare minerals. Teepelite was discovered as a new mineral species from Borax Lake in 1938, where it occurs with at least a dozen other saline and borate compounds. The rare mineral northupite, described first from San Bernardino County, also occurs at Borax Lake, making two known occurrences to date in the world . . .²⁷

However, no areas within Clearlake have been designated by the State as containing mineral deposits of regional or statewide significance.²⁸

The State's Surface Mining and Reclamation Act requires the local jurisdictions to regulate mining operations. It also requires approval of a reclamation plan as a condition for issuance of a mining permit.²⁹ The Reid Quarry use permit expired 5-27-81; it should be renewed, and an approved reclamation plan filed.

The county recently completed its Creekbed Management Plan which identifies stream areas where gravel beds may be extracted and sets guidelines related to such extraction. None of Clearlake's streams are shown as potential gravel sources.

Climate

The City of Clearlake, like much of California, is subject to Mediterranean conditions of cool, moist winters and warm, dryer summers. Located on the southeast edge of Clear Lake, the City is ringed by higher mountains to the north, east and southeast and open to the lake on the west and southwest. This protected location next to a large body of water further mediates the effects of wind and temperature.

Records show that Clearlake Park normally has a frost-free period from May 15 through October 1, an average maximum temperature of 93.4 F occurring in July and an average minimum temperature of 31.3 F occurring in January. An annual mean precipitation of 22.2 inches and mean annual snowfall of 3.5 inches with 85% of the precipitation occurring during November through March and virtually none in the summer is typical. Most prolonged winter rainstorms are from Pacific Ocean storms which approach from a northwesterly direction. Relative humidity ranges from a low of 9% to 16% during the summer to a high of 85% to 100% during the winter rainy season. The climate is not humid or muggy.

The surrounding mountains result in the Clear Lake Basin generally being protected from both the marine coastal influence and the Great Central Valley wind system. The greater wind influence is due to upslope/downslope winds generated by the local topography and are complex in nature. Coupling of the lakeshore and these wind systems in the Clear Lake basin produces extended periods of down-valley drainage winds which are often channeled through the Narrows between Mt. Konocti and High Valley Ridge, producing persistent west to northwest winds in the City of Clearlake. Winds also occur from the south to east in Clearlake. Light winds are associated with night time drainage conditions off of Quackenbush Mountain and the higher terrain to the east. Stronger winds are associated with approaching Pacific Ocean storm systems. A tabulation of wind speed and direction over a two year period monitored at South Borax Lake and at Pearce Field shows that predominant wind direction is from the northwest in Clearlake; in the southern part of the city, southeast winds also have a high frequency of occurrence.

Air Quality

Ambient air quality in the City of Clearlake is considered good with no exceeds of the California Air Quality Standards. The existing air quality is healthful and far superior to most areas of the state and nation. Air quality monitoring in Clearlake during June 1980 to May 1981 showed air quality health standards were not exceeded in Clearlake for those pollutants measured. Additionally, the LCAPCD and the California Air Resources Board have monitored air quality continuously as part of a national and state program at Lakeport since June 1980. Measurements

indicate a continued superior air quality in the Lake County Air Basin. Exceeds of ozone have occurred but are traceable to large forest and range fires. On rare occasions, exceeds of particulate standards have been recorded as a result of abnormal operation of nearby sources.

Air pollution complaints in the City of Clearlake generally result from sewer pumping stations, burning violations, natural gas vents or eutrophic conditions of Clearlake inlets. Most notably the Burns Valley area has experienced emanations of gas from the ground containing carbon dioxide, methane, and hydrogen sulfide. The city is located within the Geysers Known Geothermal Resources Area (KGRA) and exploratory projects are located within and near the Clearlake city limits. Major geothermal industrial development to the west and northwest if uncontrolled would adversely affect Clearlake. Nearby rock quarries also exist. If the best available control technology is used as has been required in the recent past, significant air quality degradation due to geothermal development is not anticipated. To expect continued superior air quality is reasonable.

Air Quality Plans and Agencies

The Federal Clean Air Act places the responsibility on state governments to formulate and adopt plans which ensure preservation of superior air quality in areas fortunate enough to enjoy such and to attain and maintain federal standards in those that are not.

The federal agency responsible for the Clean Air Act is the Environmental Protection Agency which mandates that each state develop a State Implementation Plan (SIP). The California Air Resources Board (ARB) is the state agency which administers air pollution legislation in California and is responsible for the California State Implementation Plan and California's overall program. The ARB designates regional air quality management districts to implement individual regional plans which control air pollution from stationary sources.

The Lake County Air Pollution Control District (LCAPCD) is the regional district which incorporates the City of Clearlake within its jurisdiction. Through its Board of Directors, the LCAPCD has enacted an implementation plan consisting of rules and regulations to maintain air quality standards and protect public health and welfare. This program incorporates methods to ensure public nuisance and health hazards will not result from new air pollution sources and responds to public inquiries and complaints. Presently, the program is largely limited to addressing state standards for the protection of health.

As part of the federal Clean Air Act, a prevention of significant deterioration program (PSD) for areas with superior air quality such as the Lake County Air Basin is required. It is anticipated that the LCAPCD will be delegated authority for this program after enacting an effective local program and receiving delegation from the EPA. The City of Clearlake is

downwind of northern and western Lake County and dispersion is poor as a result of frequent capping inversions and mountain ranges enclosing the small air basin. Transport of air emissions from western and northern Lake County to the Clearlake City area can occur. The need exists to consider and be aware of these facts and their impact on the City of Clearlake during future air quality planning efforts.

Effects of Poor Air Quality

Poor air quality affects humans both directly and indirectly. Deterioration of air quality results in adverse effects on human health, plants, property and environmental aesthetics. Generally state and federal standards are set to protect human health.

Much of Clearlake's population has relocated to the area to enjoy their retirement and the good air quality that exists. Generally, the elderly along with the children are markedly more susceptible to air pollution stress of the circulatory and respiratory systems which aggravates diseases such as emphysema, asthma, bronchitis, and heart disease. Increased carbon monoxide levels cause oxygen deficiency and stress on the heart. Ozone, photochemical oxidant, sulfur dioxide and suspended particulate matter cause impairment of lung function, especially in those persons with a chronic pulmonary disease. Exposure to air pollutants is also believed to contribute to pulmonary diseases even in healthy individuals.

Many plants are highly sensitive to air pollutants and scientific studies have shown that increased levels of fluoride, boron, sulfur dioxide and ozone result in significant damage to agricultural crops, decorative vegetation and forests. In urban areas, soiling from particulates and damage to metal, masonry and ornamental vegetation are also common when air quality deteriorates. Aesthetic factors such as odors and poor visibility cannot be ignored and their effect on humans is usually psychological. This can be especially damaging to vacation or recreational business areas. Because of these many effects air quality standards have been established.

Given that tourism and retirement are important to Clearlake, poor air quality must be avoided so that the area will remain attractive and healthful for recreational visitors, residents, and the retirement population seeking refuge from polluted urban areas.

Excellent opportunity exists to prevent any future significant deterioration of the prevailing superior and healthful air quality by the use of good planning and air emissions control technology.

Policy and Implementation

There are policies that Clearlake can establish and follow that will greatly enhance the preservation of good air quality within the City of Clearlake.

Planning proposals should consider land use compatibility. The location of new industrial and commercial air pollution sources should be consistent with existing adjacent land uses. Areas of industrial and agricultural development should be separated from residential areas by buffer zones to the extent that is practicable. The best available control technology should be installed on major new air pollution sources.

A transportation plan should be established that reduces the reliance on the automobile. For example, support should be extended to bikeway plans and pedestrian facilities. Land use patterns should encourage alternative means of transportation with centrally located services and shopping centers.

Roadways, parking lots and private driveways should be paved to decrease dust and particulates.

Areas of gaseous permeations or vent areas in Clearlake (i.e. Burns Valley) should be identified and a land use and compatible building code should be adopted (i.e. cement slab foundations should be avoided).

Any lakeshore management program should consider the potential for lake odor avoidance.

State Implementation Plans (SIP) and Prevention of Significant Deterioration Plans (PSD) should recognize the City of Clearlake as the largest urban center of Lake County and downwind of sources to the north and west which can adversely effect its air quality.

Unnecessary burning should be avoided, and disposal opportunities for small quantities of combustible waste materials maximized.

COMMON AND SCIENTIFIC NAMES AND CHANGES IN
RELATIVE ABUNDANCE OF THE FISHES IN CLEAR LAKE

	1894	1929	1939-41	1946-50	1961-63	1973	1978
Petromyzontidae							
Pacific lamprey, <i>Entosphenus</i> <i>tridentatus</i>	P	—	—	—	—	—	—
Salmonidae							
Rainbow trout, <i>Salmo gairdneri</i> ¹	C	C	N	N	N	N	R
Cyprinidae							
Goldfish, <i>Carassius</i> <i>auratus</i>	—	—	—	N	N	N	C
Carp, <i>Cyprinus carpio</i>	A	A	A	A	A	A	A
Thicktail chub, <i>Gila</i> <i>crassicauda</i>	C	C	P	—	—	—	—
Hitch, <i>Lavinia</i> <i>exilicauda</i>	A	A	A	C	A	A	A
Golden shiner, <i>Notemigonus</i> <i>crysoleucas</i>	—	—	—	—	C	C	N
Sacramento blackfish, <i>Orthodon</i> <i>microlepidotus</i> ¹	A	A	A	A	A	A	A
Clear Lake splittail, <i>Pogonichthys</i> <i>ciscoides</i> ^{1,2}	A	A	A	R	R	—	—
Sacramento squawfish, <i>Ptychocheilus</i> <i>grandis</i>	A	A	P	R	S	S	S
Catostomidae							
Sacramento sucker, <i>Catostomus</i> <i>occidentalis</i> ¹	A	A	P	C	S	S	S
Ictaluridae							
White catfish, <i>Ictalurus catus</i>	A	N	A	A	A	A	A
Brown bullhead, <i>Ictalurus nebulosus</i>	A	A	A	A	A	A	A
Channel catfish, <i>Ictalurus punctatus</i>	—	C	N	N	C	C	C
Poeciliidae							
Mosquitofish, <i>Gambusia affinis</i>	—	—	C	P	A	A	C

	1894	1929	1939-41	1946-50	1961-63	1973	1978
Atherinidae							
Mississippi silverside, <i>Menidia</i> <i>audens</i>	—	—	—	—	—	A	A
Gasterosteidae							
Threespine stickleback, <i>Gasterosteus</i> <i>aculeatus</i>	P	—	—	—	—	—	—
Centrarchidae							
Sacramento perch, <i>Archoplites</i> <i>interruptus</i>	C	A	C	C	R	R	R
Green sunfish, <i>Lepomis microlophus</i>	—	—	—	—	—	R	N
Bluegill, <i>Lepomis</i> <i>macrochirus</i>	—	A	A	A	A	A	A
Redear sunfish, <i>Lepomis microlophus</i>	—	—	—	—	—	R	N
Largemouth bass, <i>Micropterus</i> <i>salmoides</i>	—	C	C	C	C	C	C
White crappie, <i>Pomoxis annularis</i>	—	—	—	—	A	A	A
Black crappie, <i>Pomoxis</i> <i>nigromaculatus</i>	—	A	P	A	A	A	A
Embiotocidae							
Tule perch, <i>Hysterocarpus</i> <i>traski</i>	A	N	P	N	C	C	C
Cottidae							
Prickly sculpin, <i>Cottus asper</i>	C	N	P	N	C	C	C

Key

A = Abundant
C = Common
R = Rare

P = Present, but status uncertain
N = Not recorded and probably not present
— (blank) = Not recorded and probably not present

*Common and scientific names as promulgated in Special Publication No. 6 of the American Fisheries Society.

*Abundance data for fishes (except rainbow trout and goldfish) through 1973 is based on information from Jordan and Gilbert (1894); Coleman (1930); Lindquist, Geonier, and Hancey (1943); Murphy (1951); Cook, Connors, and Moore (1964); and Moyle and Li (unpublished data), as cited by Moyle (1976). Abundance data from 1978 is from Week (unpublished data).

Source: Larry Week, Department of Fish and Game, Yountville, California.

¹Native species.

²The validity of this species is questioned by Clark Hubbs (Copeia, 1974), as cited by Moyle (1976).

In 1980, largemouth bass collected from Clear Lake had mercury concentrations exceeding the NAS guidelines. Mercury concentrations in Clear Lake flesh fish are not a new phenomenon. Past studies have detected mercury levels as high as 1.91 ppm, with the highest levels in largemouth bass. (The FDA tolerance level for mercury in edible flesh of fish is 1.0 ug/g. The NAS guideline for protection of predators is 0.5 ug/g.) In the recent study, both white catfish and largemouth bass were collected from three locations in Clear Lake. The highest values were in largemouth bass collected at Clearlake Oaks. Largemouth bass from Lower Lake also exceeded the guideline. Mercury in Clear Lake fish is from naturally occurring cinnabar deposits located throughout the region and from years of mining.⁴⁰

There are no records available on the specific fish found in Clearlake's creeks. All species that would occur in Clear Lake would also occur in Cache Creek. The other creeks - Miller, Burns Valley and Molesworth - may provide hitch (native minnow) spawning habitat. Riparian vegetation occurs along portions of all Clearlake's creeks. No fish exist in Borax Lake.⁴¹

Wildlife and Related Habitat

While about 44 species of mammals are associated with the Clear Lake watershed, areas of the basin such as Clearlake are generally too developed to be considered important habitat for most species. The lesser developed areas of the city such as the Chapman Tract still exhibit valuable blue oak groves, interspersed with black and live oaks. The oak trees are native species which provide important habitat for a variety of birds.⁴²

Chaparral is pervasive on the slopes in the vicinity of Quackenbush Mountain and provides cover for lizards, snakes, bird species and quail, where chaparral meets woodland. Both deer and jackrabbits favor chaparral edge situations. The intrusion of homes into these areas, and the intrusion of dirt bikes and people with guns tends to lessen the value of these areas as wildlife habitat, however.⁴³

The Borax Lake area is the largest undeveloped area in Clearlake. Its plants and vegetation are well documented. Vegetation communities at Borax Lake include grass lands, valley oak savannah, chaparral (chamise and scrub oak), open woodlands (blue oak, digger pine, and manzanita) and dense woodlands (digger pines, buckeye, interior live oak). Alkali marsh, freshwater marsh and ruderal (weedy) communities are also found here. The adverse impacts of dirt bikes on the upland plant communities have been well documented.⁴⁴

Borax Lake's major importance as wildlife habitat is in providing a resting and feeding place for waterfowl. Breeding activity probably does not occur in any significant amount because of the lack of fringing marsh vegetation. Common bird species include American coots, ruddy ducks, mallards, green-winged teal and shovelers. Motorcycles, four-wheel drive vehicles and target shooting are highly disturbing to waterfowl attempting to rest at the lake. A number of other bird species utilize the shoreline or salt marsh of Borax lake. Predatory birds and mammals use the marshlands as hunting grounds.⁴⁵

Amphibians and reptiles are important members of the upland woodland community. A great variety of bird species are also supported. California quail and mourning doves are the only game species which appear with regularity. Characteristic mammals include a number of small rodents, major predators such as racoons, striped skunks, and bobcats; mountain lions are rarely likely to visit. Feral pigs and black-tailed deer are present but in low numbers. Grassland and savannah communities are widespread at Borax Lake but relatively less important and productive than woodland as wildlife habitat.⁴⁶

Rare and Endangered Species

A number of rare and endangered plant species are known to occur in Lake County; other plants and plant habitat may be identified in the future. The only rare species of animal occurring in the vicinity is the California yellow-billed cuckoo which is found in the Audobon preserve southwest of the city.⁴⁷ The bald eagle has also been sighted in Anderson Marsh.⁴⁸

Two rare and endangered plant species are known to be found in the Borax Lake area: *Eriastrum brandegeei* and *Hesperiolimon drymarioides*. These plants flower in June and July when trained observers should be able to locate them precisely. No endangered species have been identified at Borax Lake.⁴⁹

OPEN SPACE

Natural and Scenic Areas

Natural Areas. Clearlake has one area within its city boundaries, the Borax Lake and Marsh, which has been identified as having special significance by the California Natural Areas Coordinating Council. Clear Lake itself, the Anderson Marsh, and the Sulphur Bank Mine are special natural areas adjacent to the city. The first borax mined in the U.S. was from the bottom mud of Borax Lake.⁵⁰ (See section on Waters - Borax Lake for general description of the lake.) A number of interesting chemical and biotic phenomena occur at Borax Lake. When water levels are low, several large trona beds develop in the center of the lake. (Trona are a monoclinic combination of normal sodium carbonate in crystals or fibrous columnar masses.) The formation of columnar deposits of calcereous materials in the salt marsh near the lake are spectacular; they can rise to 2 feet above soil level. Marl deposits (calcium carbonate) form low domes (1 to 2 feet across) from calcium-bearing spring water coming in contact with the carbonated waters of the lake.⁵¹

In the lake waters themselves, the biota are also very interesting. Algal mats, both freefloating and attached, are evidence of the highly eutrophic capacity of the lake. Numerous balls, which are wads of fruits, fruiting stems, and leaves of ditch grass, also occur along the east shoreline. This plant occurs only in shallow waters of highly alkaline and saline lakes.⁵²

The lake occurs on both the national and international registry of proposed natural areas. The previous description of natural phenomena is only a highlight of what is found in this lake.⁵³

Clear Lake is discussed in the "Waters" section of this report. Anderson Marsh is discussed in that section as well as in "Parks and Recreation". The Sulphur Bank Mine, located to the north of the city boundaries, was mined between 1965 and 1945. The mine is also designated a State of California Landmark (see section on Cultural and Archaeological Resources.)

Scenic Areas. Views of Clear Lake, and views of Bald Mountain and Quackenbush Mountain, are important scenic amenities to many residents and visitors to Clearlake. Distant views of Mt. Konocti to the west also add to the area's visual fabric. A number of homes have been sited along the lake shore or on hillsides to take advantage of these important views. Views are also possible from some of Clearlake's streets and lakefront parks. Other natural areas within and adjacent to the city, including Borax Lake, Cache Creek, Anderson Marsh and the walnut groves of Burns Valley, are also valuable scenic resources.

Scenic Highways

Highway 53, which extends from the intersection of Highway 20 to the intersection with Highway 29 at Lower Lake, provides varying views of Clear Lake with Mt. Konocti in the distance. As the entrance to Clearlake, Highway 53 views are important to residents and tourists alike.

Highway 53 was designated a scenic corridor by Lake County; Clearlake adopted this designation upon incorporation. The corridor is 500 feet wide. It was not field surveyed and therefore is not necessarily sensitive to local variations in topography, views and existing development.⁵⁴ The Zoning Code (Ordinance No. 1249) restricts certain uses from the scenic corridor and provides development standards to regulate permitted uses and land divisions.

It may be useful to re-evaluate the alignment of the scenic corridor and recommend a more realistic alignment which takes vistas (and road cuts which block views) into account. Consideration could also be given to a Clearlake vista point. Lakeport and Caltrans both contributed to a vista point in that city. An appropriate site with feasible access, commitment from the city, and availability of funding from the State Department of Transportation would be required.⁵⁵

AGRICULTURE

Agricultural land comprises 490 acres, or about 22% of Clearlake. The walnut groves in Burns Valley and near Borax Lake account for most of the agricultural land, though some new and older vineyards exist north of Cach Creek and more have proposed as part of a planned development near Borax Lake.

The walnut trees are predominantly in ten- to twenty-acre parcels and are farmed separately. Since the trees are twenty to forty years old, they have slight agricultural value, but important aesthetic value for shade and appearance. Most of the trees have not received adequate care to live productively to 80 years, but this has not reduced the value of the walnut acreage. There is still a demand for acreage with a crop on it that serve as a hobby enterprise for retired people. A family can tend an orchard throughout the year; about 1 employee per acre is required for the one month harvest.⁵⁶

The U.C. Cooperative Extension Advisor estimates that 70-80% of Lake County walnuts are not making an economic return to the agricultural investment, but do make a good return on the land investment. From 2,000 to 3,000 lbs./acre/year of walnut production is needed to pay for costs including taxes, depreciation, interest on the investment and management. The county's best orchards produce from 2,000-4,000 lbs./acre but most orchards produce less. This partially explains the lack of orchard maintenance effort. Groundwater for irrigation is limited, pumping costs are high, and frost is a danger. These factors are more limiting than the lack of maintenance.⁵⁷

While the orchards are taxed for their agricultural value, many small orchards have been purchased for their residential subdivision potential. Three to four years ago, land costs were about \$8-10,000/acre. Today's prices are about \$15,000 to 20,000/acre. The continuing land appreciation gives walnut orchard owners the potential profit they have not had for the last twenty years; this is an incentive to keep the land in walnuts.⁵⁸

Six parcels are under Williamson Act contract in Clearlake. All are walnut orchards located in Burns Valley. Since the passage of Proposition 13, the incentive to enter to Williamson Act contracts to reduce property taxes has been greatly reduced.

Potential conflicts between agricultural operations and residential uses are well known. Walnuts have to be sprayed once or twice a year. Also, disking creates dust. Vineyards are protected from birds by noise makers; some vineyards are also disked. Frost protection is accomplished by spraying water on the vines.⁵⁹

PARKS AND RECREATION

In Clearlake, 50 acres or 0.7% of the city is developed park land or open space. Two county parks both located on Clear Lake form the backbone of the city's park facilities (see Figure 1). Redbud Park provides 13 acres with barbecue and picnic area, meeting and senior citizen halls, tennis and baseball facilities, lakefront access including a boat launch and fishing pier, and rest rooms. Austin Park has a picnic area, lakefront access, fishing, playgrounds, beaches and restrooms. Clearlake's local parks are heavily used during warm weekends throughout the spring, summer and fall. Local interest in expanded recreation facilities has been so great that a ball field has been constructed with volunteer labor at Austin Park to expand facilities at that location.

Beyond the city boundaries, Lake County has 20 parks and recreation available year round for residents and visitors, providing outstanding opportunities for regional recreation. Hiking, hunting, picnicking, fishing, swimming, and camping are some of the activities. Private facilities and resorts offer golf courses, tennis courts, swimming pools or lake access, and marinas.⁶⁰

The State Department of Parks and Recreation has recently acquired 1,006 acres of Anderson Marsh for a state park. The State has paid \$3.5 million to purchase the acreage near Cache Creek between Clearlake and Lower Lake. At public hearings in August 1982, a number of citizens protested an application for a general plan amendment which would have allowed a substantial amount of residential development on the property. The State accelerated their acquisition process in response to the public interest generated by the amendment application.⁶¹

Clearlake has numerous opportunities for adding park and recreation areas to the city's inventory. Neighborhood parks require several acres and could be developed on vacant land in a number of Clearlake's neighborhood. Borax Lake (discussed in sections on "Waters" and "Natural Areas") is Clearlake's most unique natural feature as well as the largest undeveloped area in the city. Its use should be carefully considered. Schoolteacher Hill provides outstanding views of Clear Lake and Mt. Konocti and could provide picnic and relaxation opportunities in a unique aesthetic setting. Cache Creek (discussed in "Waters" section) has two opportunities for recreational/open space use. At the upper reach (section 36, township 13N, range 7W) there may be an excellent opportunity to provide a picnic or camping facility while preserving the natural features. The lower reach of Cache Creek, the peninsula north of the Anderson Marsh, is the largest undeveloped area in Clearlake on the lake shoreline. Its unique marsh-lake-and-riparian associations should be considered for preservation and use as a natural area in conjunction with the State's purchase of the Anderson Marsh. Lastly, the area in the vicinity of the sewage treatment plant may have potential for recreational development.

In addition to a variety of areas which could become part of the city's park plan, creek corridors and a transmission line corridor could be utilized to tie facilities together. Hiking, bicycling or pedestrian trails could be developed to link park facilities, while providing recreational opportunities and visual amenities in and of themselves. Five smaller areas have been identified along the Clear Lake shore which could be utilized for public access to the lake. Places to picnic or simply sit and enjoy the lake could be developed.⁶²

ENVIRONMENTAL CONSTRAINTS

FLOODWAYS AND FLOODPLAINS

Flood hazards in Clearlake could occur from creeks or from Clear Lake. The potential for creek flooding is affected by the rate and amount of precipitation, soil type, slope of the watershed, extent and type of vegetation cover, and extent of any fire damage to the area. Flooding in Lake County results from prolonged heavy rainfall over tributary areas from November to March. The severity of flooding is accentuated if grounds are already saturated or when the ground is frozen and soils cannot absorb water. Both Clear Lake and Borax Lake are subject to flooding when floodwaters flow into them and exceed the rate at which lake waters (from Clear Lake only) can be discharged. Borax Lake has no outlet.¹

Clear Lake

Much damage to lakeside dwelling, piers, boats and developed recreational areas has occurred during floods of Clear Lake. Since 1874, a stage of 7.56 (the high water mark) has been exceeded 47 times, and a stage of 9.0 23 times. The Rumsey gauge is a standard measure of Clear Lake elevation. Yolo County is required to regulate lake outflow so that lake levels are maintained between a minimum of 0.0 feet Rumsey and a maximum of 7.56 Rumsey. However, during storms, the lake level may exceed 7.56 but for no longer than 10 days and in no event over 9 feet on the gauge. During storms, flooding is still a hazard even with these regulations, as the 1982 rainy season demonstrated.²

Damage to structures from lake flooding may be greater than from creek flooding due to longer period of standing water. Average annual flood damages for the Clear Lake rim, computed by the U.S. Army Corps of Engineers for existing conditions and 1977 prices, are \$1,338,900. Development along the lakeshore is subject to the Flood Plain Management Ordinance which has development standards which should reduce flood hazards over the long term. The risk to human life is low because there is generally ample time to evacuate lakeshore residences prior to flooding.³

A "seiche" is a periodic up-and-down movement of water level at each end of an enclosed or partially enclosed body of water such as a lake. On Clear Lake, seiches can be induced by faulting directly within the lake basin, landslides, or seismic shaking from tectonic activity. Clear Lake would probably most be affected by seismic shaking (see fault map, Figure 5). The probability of a seiche is small and there is no historic data indicating that significant damage has occurred locally as a result of one.⁴

One Hundred Year Floodplain

A standard in flood protection planning is to protect against the 100-year flood. This is the flood of a magnitude which can be expected to occur on the average of once every one-hundred years. The areas adjacent to Burns Valley Creek and its overflow (Miller Creek), and Molesworth Creek that are subject to flooding are shown in Figure 2.

The 100-year floodplains are designated as part of the National Flood Insurance Program (HUD). To receive federal relief money in the event of major flooding, and to insure conventional construction and mortgage loans from federally-insured banks, local jurisdictions must participate in the program as mandated by the 1973 Flood Disaster Protection Act. The act requires the regulation of land use and construction within 100-year floodplains, accomplished in Clearlake by the Flood Plain Management Ordinance.⁵

The city contracted with Harris and Associates to prepare a Storm Drainage Master Plan for Burns Valley Creek Watershed to help make policy decisions related to new development in that watershed. The moderate growth of the city accentuates existing drainage problems and increases the potential for damage from flooding. Recommendations from the study, published in April 1982, include establishing a drainage service fee on new development, prioritizing flood control projects needed and constructing projects as funds are available, and cleaning out existing creeks and upgrading inadequate street crossing culverts. Also, the study recommends continuing the city's existing policy of requiring construction of storm drainage facilities at the time of development in conformance with the Storm Drainage Master Plan.

CULTURAL AND ARCHAEOLOGICAL RESOURCES

The Clearlake area is especially rich in archaeological resources, and has an interesting pioneer history as well. The earliest recorded historical account of the area is provided by Dr. John A. Veatch in January 1856. He visited what was to become known as Borax Lake, sampling the mud and discovering the borax. The whole region bore marks of recent volcanic activity. From the ridge southeast of the lake, Dr. Veatch found hot sulfurous fumes still issuing.⁶

Resource extraction at the lake began in 1864 and continued until 1872, when operations ceased presumably because of mismanagement (not because the borax was exhausted). While in operation, the plant supplied almost all the borax needs of the United States. Chinese laborers performed much of the mining work. Some remnants, such as fire pits, furnaces, and foundations, exist at Borax Lake.⁷

The Burns Valley area was settled by Englishmen in the 1880s. Located at the southern end of the valley, the Henry Bowers Ranch, one of the largest, consisted of about 500 acres. Cattle, hogs, hay and grain were raised. The Bowers house was located about two hundred feet from the lake. It was demolished when John Garner and his wife Clara purchased the ranch about 1918. Lakeshore Village and the Garner Ranch occupy the Bowers Ranch site today. Mr. Bowers's grave is located near Old Highway 53.⁸

The Burns Valley School began as a one-room red building in Burns Valley prior to 1870. In 1885, the school house was cut in two and moved by horse and wagon to a second location, the Bowers property or Bowers Flat. There were a number of enlargements, culminating in a new W.P.A. school in 1936.⁹

Clearlake Highlands was formerly the Beakbane Ranch. The ranch was about 680 acres with a mile of lakefront, some farmland, and the rest range land. In 1921-22, the land was sold to Los Angeles developers Philips and Hambaugh for \$155,000 who created the Clearlake Highlands Subdivision.

Other information on Clearlake's historical background has been supplied to the General Plan consultants. It would be worthwhile reviewing, verifying, and presenting this information in a manner of use to the Clearlake community. Also, the Cultural Resources Evaluation for the Clearlake Collector Sewer System EIR (District 1-6 Area), prepared in July 1982 by David Chavez, provides a good overview of both the history and archaeology of Clearlake.¹⁰

While there are no currently designated historical sites within the city boundaries, the Anderson Marsh Archaeological District is just to the south of Cache Creek. It is listed on the National Register of Historic Places. Just north of the city, the Sulphur Bank Mine is designated State of California Landmark 428.¹¹

AMBIENT NOISE

Purpose

California State Government Code Section 65302²(g) requires all general plans to include a noise element. The noise element is to be expressed in quantitative terms, showing contours of present and projected noise levels associated with growth and traffic activity. Noise exposure information shall become a guideline for use in development of the land use element to achieve noise compatible land use, and also to provide baseline levels and noise source identification for local noise ordinance enforcement.

The Office of Noise Control within the State Dept. of Health prepared guidelines (effective January 1, 1976) which clarified noise element requirements. The fundamental goals of the Noise Element as stated in the guidelines are:

- To provide sufficient information concerning the community noise environment so that noise may be effectively considered in the land use planning process. In so doing, the necessary ground work will have been developed so that a community noise ordinance may be utilized to resolve noise complaint situations.
- To develop strategies for abatement of excessive noise exposure situations involving implementation of cost-effective mitigating measures in combination with re-zoning as appropriate to avoid incompatible land uses.
- To protect those existing regions of the study area whose noise environment, in the form of CNEL or L_{dn} noise contours as provided in the Noise Element for local compliance with the State Noise Insulation Standards. These standards require specified levels of outdoor to indoor noise reduction for new multi-family residential construction in areas where the outdoor noise exposure exceeds CNEL (or L_{dn}) 60 dB.

Planning Criteria and Noise Emission Standards

Two considerations are important in planning for a desired community noise climate. Certain areas may be unsuitable for some types of land use due to fixed noise sources such as major roadways and airports. It is therefore desirable to establish criteria by which the city may determine acceptable land uses for a given site with respect to noise compatibility. Second, limits must be placed on the noise emissions of individual sources to ensure that noise levels within any given land use remain within or are scheduled to descend to some recommended level.

A. Land Use Planning Criteria

Table 2 (p. 26) shows typical sound levels for common noise sources in dBA, to provide a frame of reference for the following discussion. The U.S. Environmental Protection Agency has researched the effects of noise on people. Table 3 (p. 27) summarizes these findings. The three critical noise levels are exposures to average levels of greater than 70 dB over forty years for hearing loss, 55 dB over 24 hours for outdoor activity interference and annoyance, and average levels of greater than 45 dB over 24 hours for indoor activity interference and annoyance. One of the major concerns is the maintenance of a noise level low enough so as not to interfere with normal human speech; other activities are sleep, reading, studying, eating, relaxing, listening to records, tapes, or radio, watching television, and occupation-related activities.¹²

Outdoor noise levels compatible with various land use categories are shown in Table 4 (p. 28). These criteria may be used to determine the suitability of new development on lands subject to existing or projected noise levels.

With regard to indoor noise levels, noise reduction as a result of building type has been documented by the Federal Highway Administration; this information is contained in Table 5.

Table 5

SOUND LEVEL REDUCTION DUE TO BUILDING TYPE AND WINDOW CONDITION

<u>Building Type</u>	<u>Window Condition</u>	<u>Reduction of Noise from Outside Sources</u>
All	Open	10 dB
Light Frame	Ordinary, sash closed	20 dB
Masonry	Single pane, closed	25 dB
Masonry	Double pane, closed	35 dB

Source: Earthmetrics, Inc., City of Concord Noise Element, 1976.

B. Requirements of the State Housing Act and OSHA

In addition to these recommendations, the California State Housing Act (Administrative Code, Title 25, Article 4) specifically requires the following of non-single family detached residential units:

Table 2

TYPICAL SOUND LEVELS FOR COMMON NOISE SOURCES IN dBA

Overall Quality	dBA	Outdoor	Indoor
Uncomfortably loud	130	50-horsepower siren at 100'	-
	120	Jet take-off at 200 feet	-
	110	-	Rock-n-roll band
Very loud	100	Jet flyover at 1000 feet, power mower	Newspaper press
	90	Motorcycle at 25 feet	Food blender
Moderately loud	80	High urban ambient sound; passenger car, 65 mph at 25 feet	Garbage disposal, clothes washer
	70	-	TV audio, vacuum cleaner
	60	Air conditioner at 20 feet	Electric typewriter, conversation
Quiet	50	Light traffic at 100 feet	Average residence
	40	Bird calls, lower limit urban ambient noise	-
Very quiet	30	-	Soft whisper
Just audible	20	-	Television studio, leaves rustling
	10	-	-
Threshold of hearing	0	-	-

Table 1

SUMMARY OF NOISE LEVELS IDENTIFIED AS REQUISITE TO PROTECT PUBLIC
HEALTH AND WELFARE WITH AN ADEQUATE MARGIN OF SAFETY

EFFECT	LEVEL	AREA
Hearing Loss	$L_{eq(24)} \leq 70$ dB	All areas
Outdoor activity interference and annoyance	$L_{dn} \leq 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widely varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq(24)} \leq 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{dn} \leq 45$ dB	Indoor residential areas
	$L_{eq(24)} \leq 45$ dB	Other indoor areas with human activities such as schools, etc.

Notes:

$L_{eq(24)}$ represents the sound energy averaged over a 24-hour period while L_{dn} represents the L_{eq} with a 10 dB nighttime weighting. L_{dn} is approximately equal to CNEL.

The hearing loss level identified here represents annual averages of the daily level over a period of forty years. (These are energy averages, not to be confused with arithmetic averages.)

Source: Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety, United States Environmental Protection Agency, March, 1974. cited in Earthmetrics, Inc., City of Concord Noise Element, 1976.

TABLE -

LAKE COUNTY LAND USE/NOISE LEVEL COMPATIBILITY CRITERIA

LAND USE CATEGORY	COMMUNITY NOISE EXPOSURE L_{dn} , dB					
	55	60	65	70	75	80
RESIDENTIAL-LOW DENSITY SINGLE FAMILY, DUPLEX MOBILE HOMES	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
RESIDENTIAL MULTI. FAMILY	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
TRANSIENT LODGING HOTELS, HOTELS	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
SCHOOLS, LIBRARIES CHURCHES, HOSPITALS NURSING HOMES	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
AUDITORIUMS, CONCERT HALLS, AMPHITHEATERS	Conditionally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
SPORTS ARENAS, OUTDOOR SPECTATOR SPORTS	Conditionally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
PLAYGROUNDS, NEIGHBORHOOD PARKS	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
GOLF COURSES, RIDING STABLES, WATER RECREATION, CEMETERIES	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
OFFICE BUILDINGS, BUSINESS COMMERCIAL AND PROFESSIONAL	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable
INDUSTRIAL, UTILITIES MANUFACTURING, NON- RESIDENTIAL AGRICULTURAL	Normally Acceptable	Conditionally Acceptable	Conditionally Acceptable	Normally Unacceptable	Clearly Unacceptable	Clearly Unacceptable

NORMALLY ACCEPTABLE

Specified land use is satisfactory, based on the assumption that any buildings involved are of normal conventional construction without any special noise insulation requirements.

CONDITIONALLY ACCEPTABLE

New construction or development should be undertaken only after a detailed analysis of the noise reduction requirements is made and needed noise insulation features are included in the design. Conventional construction, but with closed windows and fresh air systems and air conditioning will normally suffice.

NORMALLY UNACCEPTABLE

New construction or development should generally be discouraged. If construction or development does proceed, a detailed analysis of the noise reduction requirements must be made and needed noise insulation features included in the design.

CLEARLY UNACCEPTABLE

New construction or development should generally not be undertaken.

Source: Sedway/Cooke, Lake County General Plan, 1981

Noise Insulation from Exterior Sources:

- (1) Location and Orientation. Consistent with land-use standards, residential structures located in noise critical areas, such as proximity to select systems of county roads and streets (as specified in 186.4 of the State of California Streets and Highways Code), railroads, rapid transit lines, airports, or industrial areas shall be designed to prevent the intrusion of exterior noises beyond prescribed levels with all exterior doors and windows in the closed position. Proper design shall include, but shall not be limited to, orientation of the residential structure, set-backs, shielding, and sound insulation of the building itself.
- (2) Interior Noise Levels. Interior community noise levels (CNEL)* with windows closed, attributable to exterior sources shall not exceed an annual CNEL of 45 dB in any habitable room.
- (3) Airport Noise Source. Residential structures to be located within an annual CNEL countour (as defined in Title 4, Subchapter 6, California Administrative Code) of 60 dB require an acoustical analysis showing that the structure has been designed to limit intruding noise to the prescribed allowable levels. CNEL's shall be as determined by the local jurisdiction in accordance with its local general plan.
- (4) Vehicular and Industrial Noise Sources. Residential buildings or structures to be located within annual exterior community noise equivalent level countours of 60 dB adjacent to the select system of county roads and city streets (as specified in Section 186.4 of the State of California Streets and Highways Code), freeways, state highways, railroads, rapid-transit lines and industrial noise sources shall require an acoustical analysis showing that the proposed building has been designed to limit intruding noise to the allowable interior noise levels prescribed in Section T25-1092(e) (2). Exception: "Railroads where there are no nighttime (10:00 p.m. to 7:00 a.m.) railway operations and where daytime (7:00 a.m. to 10:00 p.m.) railway operations do not exceed four (4) per day."

Since most residential structures (with windows closed and single pane glass) have the capability of reducing noise levels from exterior sources by 20 dBA, the State's interior standard of 45 dBA should normally be achieved when exterior levels do not exceed 65 dBA. It should also be noted that implementation of the State act requires that the precise location of the 60 dBA (CNEL or L_{dn}) contour be known.¹³

*The Community Noise Equivalent Level (CNEL) scale is approximately equal to the L_{dn} scale.

In certain cases where the functional use of a building is such that windows are not opened and outdoor areas are not used for any reasons other than parking and walking into the building, outdoor noise levels might be ignored and indoor noise level planning criteria may be more appropriate, the indoor noise level planning criterion should be 45 CNEL. Because the indoor noise level planning criterion therefore supersedes the outdoor criteria, it is of utmost importance that building plans and building inspections be sufficiently detailed to insure that the indoor criterion will be achieved in these cases regardless of the outdoor noise levels. Improper choice of materials and/or improper installation of such materials can make them ineffective.¹⁴

C. Noise Emission Standards

Standards for air and ground transportation noise sources, Clearlake's major sources of noise, have been established by State and Federal government agencies. Since Clearlake can enforce ground transportation emission standards through its Police Department, the standards are presented here. Table 6 presents State standards for motor vehicles operating on public roadways; Table 7 presents State standards for new motor vehicles at the time of sale (both tables, p. 31).

Noise Environment

In Clearlake, the absence of noise is a natural resource which attracts residents, particularly retired persons, and tourists who seek a peaceful to live or relax and recreate. Except for activity at Pearce Field, Clearlake has a quiet noise environment.

Background noise levels in the undeveloped areas surrounding the City are as low as can be found in an outdoor setting. Daytime levels of between 20 and 30 dBA in the hills are common.¹⁵ Such a quiet environment is very susceptible to increases in noise; residents are sensitive to any noise intrusion.

A. Noise Sources

As people continue to move to Clearlake and as tourism increases, noise levels will rise. Noise sources in Clearlake include (not in order of importance): traffic, aircraft, off-road vehicles, agricultural pest and frost control equipment, a rock quarry, and residential noises (e.g. barking dogs and power tools). Potential noises include geothermal development and power boats. Temporary construction noise is not addressed but would occur at major development sites.

1. Road Traffic. Automobile and truck traffic constitutes the most prevalent noise source in the city. Summer traffic volumes are much higher than in winter because of the influx of tourists. Also, increased agricultural activities raise the summer level of highway traffic generated noise. Traffic generated noise, especially near highways, is dominated by heavy truck noise (which is primarily caused by engine casing radiation and exhaust stacks).¹⁶

Table 6

CALIFORNIA STATE NOISE EMISSION STANDARDS FOR MOTOR VEHICLES
(at 50 feet from center lane of travel)

<u>Vehicle Type</u>	<u>< 35 mph</u>	<u>> 35 mph</u>
Trucks*	88	90
Motorcycles	82	86
Automobiles	76	82

*For trucks manufactured after 1973, and operating at 35 mph or less, the maximum level allowed for is 86 dBA.

Notes:

Trucks are defined to be "Any motor vehicle with a manufacturer's gross vehicle weight of 6,000 lbs. or more, and any combination of vehicles towed by such motor vehicles."

Motorcycles are defined to be "Any motor vehicle other than a tractor or 'motor driven cycle' having a seat or saddle for use of the rider and designed to travel on not more than three wheels in contact with the ground and weighing less than one thousand five hundred pounds (1,500 lbs.)."

Automobiles are defined to be "Any other motor vehicle and any combination of vehicles towed by such motor vehicle."

Source: Earthmetrics (see Table 5).

Table 7

CALIFORNIA NOISE STANDARDS FOR NEW MOTOR VEHICLES
AT THE TIME OF SALE

<u>Class</u>	
<u>Motorcycles:</u>	
Until 1/1/73	88 dBA
After 1/1/73	86 dBA
After 1/1/75	80 dBA
After 1/1/77	75 dBA
<u>Light Vehicles:</u>	
Until 1/1/73	86 dBA
After 1/1/73	84 dBA
After 1/1/75	80 dBA
After 1/1/77	75 dBA
<u>Heavy Vehicles:</u>	<u>(6,000#)</u>
Until 1/1/73	88 dBA
After 1/1/73	86 dBA
After 1/1/75	83 dBA
After 1/1/77	80 dBA

Source: Earthmetrics (see Table 5).

L_{dn} contours are shown for State Route 53, the major source of roadway noise in Clearlake in Figure 3. The contours shown are based on peak month traffic volumes measured by Caltrans in 1976. Traffic volumes have not increased appreciably since then to warrant a recalculation of the SR 53 noise contours. Also, traffic projected for the year 2000 would not affect the noise contours.¹⁷

Although traffic generated noise is widespread in Clearlake, it has not been considered a serious problem. The scenic highway setback along SR 53 of a minimum of 500 feet may not be sufficient to avoid future land use conflicts.¹⁸ While there were no complaints on file from traffic generated noise, there are a number of existing residences and undeveloped residential lots within the 500-foot scenic corridor setback. (The 55 dBA noise contour along SR 53 is approximately equal to the 500 foot scenic corridor setback.)

2. Aircraft. Pearce Field is a county-owned general aviation airport located west of SR 53 in the southern part of Clearlake. A helicopter flight training school associated with Resort Aviation has recently started training students. In July 1982, the Clearlake City Council held a workshop on complaints resulting from helicopter noise and low-flying aircraft at Pearce Field. Helicopter training sessions are held near the sulphur mines near Clearlake Oaks, but access to the airport is necessary because the Federal Aviation Administration (FAA) requires trainees to utilize airport flight patterns. Clearlake residents complained of as many as 17 flights in one day on at least one occasion, though the flight instructor tries to limit flights to five per day.¹⁹ The recently prepared Airport Master Plan shows existing and projected noise contours for Pearce Field (see drawings, p. 33). While only a few structures are within the 1980 55 CNEL contours for Pearce Field, many homes will be subject to 55 CNEL noise levels by the year 2000.

According to FAA regulations, the Minimum Enroute Altitude (MEA) for airways crossing Lake County is five thousand feet above mean sea level. Airline traffic overflights are generally at an altitude in excess of 15,000 feet and are not audible on the ground. Near Lakeport, helicopters occasionally give rides at power boat races, contributing to the noise generated by those events.²⁰

*The most common unit of measurement of noise levels is the decibel. Based on a logarithmic scale, the decibel measures the intensity of sound. The threshold of human hearing corresponds roughly to 0 dB, and the threshold of pain is about 140 dB. The "A-weighted" sound level is an adjustment to the dB measurement to account for the fact that human hearing is less sensitive at low frequencies and high frequencies. This weighting is expressed dBA. The perceived loudness of a sound does not increase proportionally with the decibels because decibels are measured on a logarithmic scale. For example, a ten dBA increase in A-level is subjectively heard as a doubling in loudness.

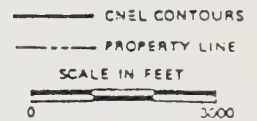
PEARCE FIELD AIRPORT NOISE CONTOURS (CNEL)



1980



2000



Source: Wadell Engineering Corporation, as presented in
Lake County General Plan

3. Off-road Vehicles. Off-road vehicles including motorcycles and four-wheel drives have been traversing the hillsides near Borax Lake for a number of years. The Parkwoods Subdivision, the nearest residential area, lies approximately 1/3 mile southeast of the site.²¹ However, there have been no noise complaints from this noise source.²²

The responsibility for setting noise standards for motor vehicles rests with state and federal agencies. Enforcement of noise complaints rests with the Police Department in Clearlake.

4. Agricultural Hazard Control. Over four hundred acres of land remain in agricultural production within the city limits of Clearlake, primarily walnuts and vineyards. Vineyards are protected from birds by pest control devices that make a popping sound like that of a shotgun at irregular intervals. The noise is loud but of a short duration so that it cannot easily be measured on an impulse level meter.²³

5. Rock Quarry. The Reid rock quarry is located in northern Clearlake. The machinery at the quarry is loud, but does not affect any homes because of its remote location.²⁴

6. Residential Noise. In every community barking dogs are cause for occasional complaints. No specific source data are available. Power tools, including lawnmowers, chainsaws and other motorized tools, can also create a noise nuisance. These devices are primarily powered by two-cycle engines with small mufflers. The Environmental Protection Agency sets noise standards for the manufacture of power tools. Although mowers and chainsaws are in widespread use in Clearlake, there is no record of noise complaints about them.

7. Commercial Noise. The only noise complaint registered with the Clearlake Planning Department has been related to "Foods, Etc.", which is located on Lakeshore Drive. Residents living near the store north of 40th Avenue were disturbed by loud machinery.²⁵

8. Power Boats. Clear Lake attracts many boaters and water skiers as a pleasure boating recreational center. While all types of boats use the lake, the noisiest are the inboard powered ski boats with unmuffled (dry stack) exhausts. Small outboard powered vessel noise levels range from 65 to 95 dBA at a distance of 50 feet; larger inboards produce levels as high as 100 dBA at the same distance.²⁶

Approximately six powerboat regattas are held annually on weekends during summer months. In addition to the noise generated by powerboats, public address systems and helicopter rides contribute to noise levels at the Labor Day weekend regatta.²⁷ To date, however, none of the regattas are held in Clearlake, and noise from those held across the lake does not reach the city. Motor boat noise from the eastern end of Clear Lake is audible but is not excessive.²⁸ There is one public boat launching ramp, located at Redbud Park. There are many private boat docks.

9. Geothermal. Noise from geothermal development could affect Clearlake residents if the geothermal resources of the Borax Lake area are developed. Residents of Anderson Springs, Whispering Pines and the Cobb Valley area in southwestern Lake County have registered complaints about geothermal-induced noise. Construction activities, well drilling, test and venting, power plant operation and truck traffic are the primary sources of geothermal related noise. Table 8 provides calculated noise levels for various geothermal activities.²⁹

B. Sensitive Areas

Noise sensitive areas in Clearlake include the Redbud Community Hospital, the Burns Valley School and the Highlands Retreat Rest Home. Residential areas are also considered noise sensitive. Noise levels were measured at three noise sensitive areas listed above (see Table 9). The measured daytime Leg level is shown, as well as the calculated L_{dn} level. The Redbud Community Hospital has a L_{dn} of 60 dBA. An L_{dn} of 60 is considered to be the maximum outdoor noise level suitable for development of a hospital.

Table 8

CALCULATED NOISE LEVELS AT VARIOUS DISTANCES
FROM GEOTHERMAL DEVELOPMENT

Activity	Noise Level (dBA)*						
	50 ft.	328 ft.	820 ft.	1,640 ft.	0.6 mi.	0.9 mi.	1.3 mi.
Construction	95	82.5	69	59	50.5	45.5	42.5
Mud Drilling	85	72.5	59	49	40.5	35.5	32.5
Air Drilling with Cyclonic Muffler	88	75.5	62	52	43.5	38.5	35.5
Air Drilling with in Steam with Cyclonic Muffler	90	77.5	64	54	45.5	40.5	37.5
Well Cleanout Cyclonic Muffler	90	77.5	64	65	45.5	40.5	37.5
Without Muffler	125	112.5	99	89	80.5	75.5	72.5
Production Testing Cyclonic Muffler	90	77.5	64	65	45.5	40.5	37.5
Commercial Test Muffler	100	87.5	74	64	55.5	50.5	47.5
Standby Well Venting	75	62.5	49	39	30.5	25.5	22.5
Total Unit Noise	80	60	54	44	36	31	27.5

*Noise levels are based upon a Simplified Geysers Model attenuation curve.

Source: Westec Systems, Inc., DEIR California State Lands Commission Proposed Geysers Geothermal Resource Leasing Program, February 1982, p. 221.

Table 9

NOISE LEVELS AT NONRESIDENTIAL
SENSITIVE LOCATIONS

	Measured L_{eq} (dBA)	Calculated L_{dn} (dBA)
Redbud Community Hospital 18th Avenue & Highway 53	57	60
Highlands Retreat 15190 Konocti View Road	*	*
Burns Valley School Austin Boulevard & Pine	49	50

*No information available.

Source: Sedway/Cooke, Lake County General Plan, Noise Element, 1981.

GEOLOGIC AND SEISMIC HAZARDS³⁰

BACKGROUND

SEISMIC ACTIVITY

Nature of Hazard

An earthquake can be described as a vibration or sudden undulation of a portion of the earth's crust, caused by the splitting or faulting of a mass of rock or by volcanic or other disturbances.³¹ Earthquakes pose hazards to developed areas as a result of ground displacement (surface rupture), ground shaking, and ground failure. A map showing "Generalized Geology and Seismicity" (available for review at the Lake County Planning Department) shows the location of faults in Lake County. This information was derived from "The Fault Map of California," produced by the California Division of Mines and Geology. See Figure 5 for fault lines in and near Clearlake.

Ground Displacement

Ground displacement or surface rupture occurs along faults. It has been observed that any fault movement beneath a building in excess of an inch or two could have catastrophic effects on the structure.³² Displacements of the earth's crust may be vertical, horizontal, or both and may offset the ground by as much as 30 feet. Although no faults within Lake County are known to have ruptured the ground surface within the past 200 years, there are numerous faults which have ruptured geologically young (Quaternary) earth materials within the past two million years. These faults are considered to be potentially active. The likely location of surface rupture or displacement during the next earthquake will probably occur along these identified potentially active faults, which are identified in Tables 10 and 11 (pp. 38 and 40, respectively).

Ground Shaking

A second type of hazard associated with earthquakes is ground shaking. This hazard usually, but not always, is the greatest cause of structural damage in developed areas (California Council on Intergovernmental Relations, 1972). Structures of all types, including engineered structures and public utility facilities, if inadequately constructed or not designed to withstand the shaking force, may suffer severe damage or collapse. Older, reinforced masonry buildings are the most prone to ground shaking damage. Among modern structures, tall buildings are more prone to ground shaking damage than are low buildings, but all types of buildings can be designed and constructed to avoid such damage. The vast majority of deaths during earthquakes are the result of structural failure.

Table 1.

POTENTIALLY ACTIVE FAULTS WITHIN LAKE COUNTY

NAME	LOCATION	APPROX. LENGTH (MI)	TYPE OF FAULT*	MAX. CRED. EARTHQUAKE	MAX. PROB. EARTHQUAKE	REFERENCE FOR LOCATION & ACTIVITY	COMMENTS
Unnamed	T16N, R8W	3	SS(?)	5 1/4±	4 ±	McNitt, 1967	Offset Quaternary earth materials.
Unnamed	T15N, R9W	1	DS N	5 ±	4 ±	McNitt, 1967	Offset Quaternary earth materials.
Wolf Creek	T15N, R7W T14N, R7W	6	DS	5 3/4±	4 ±	McNitt, 1967-68	Extension of Burns Valley and Paradise Canyon Faults
Burns Valley	T14N, R7W T13N, R7W	9	DS	6 ±	4 ±	McNitt, 1967-68	Offset Quaternary earth materials.
Paradise Cyn.	T14N, R7W T14N, R6W	9	DS	6 ±	4 ±	McNitt, 1967-68	Offset Quaternary earth materials.
Big Valley	T14N, R9-10W T12N, R8W	27	SS RL DS	6 1/2±	4 1/2±	Goff & McLaughlin, 1976 Hearn & others, 1975 Soil Mechanics & Foundation Eng., 1967 Chapman, 1975	Offset Quaternary earth materials.
Cobb Valley	T12N, R9W T11N, R7W						Offset topographic feature
Collayomi	T11N, R7W T11N, R7W						Alignment of micro-earthquake epicenters.
Konocti Bay	T14N, R8W T12N, R7W	13	DS SS RL	6 1/4±	4 1/2±	Hearn & others, 1975 Chapman, 1975	Offset Quaternary earth materials; micro-earthquakes in vicinity.
Adobe Creek	T13N, R9W	3	DS N	5 1/4±	4 ±	Jennings, 1975 Soil Mechanics & Foundation Eng., 1967	Ground water barrier; offset Quaternary earth materials.
Wight Way	T13N, R9W	4	DS R	5 1/2±	4 ±	Soil Mechanics & Foundation Eng., 1967	Ground water barrier; offset Quaternary earth materials.
Numerous faults within Clear Lake Volcanics	T12-13N, R7-9W	Variable, 1 to 4	DS (?)	6 ±	4 ±	Hearn & others, 1975 Chapman, 1975 Jennings, 1975	Micro-earthquakes in vicinity; offset Quaternary earth materials.
Borax Lake	T13N, R7W	6	(?)	5 3/4±	4 ±	Hearn & others, 1975 Chapman, 1975 Jennings, 1975	Micro-earthquakes in vicinity; offset Quaternary earth materials.
Dry Creek	T13N, R7W	6	(?)	5 3/4±	4 1/2±	Jennings, 1975	Offset Quaternary earth materials.
Wilson	T13N, R6W T13N, R5W	7	DS	5 3/4±	4 ±	Lawton, 1956	Offset Quaternary earth materials.
Kennedy	T13N, R6W T13N, R5W	7	DS	5 3/4±	4 ±	Lawton, 1956	Offset Quaternary earth materials.
Hunting	T13N, R6W T12N, R5W	8	DS	5 3/4±	4 ±	Lawton, 1956	Offset Quaternary earth materials.
Cobb Mountain	T11N, R7-8W R7-9W	Variable 1 to 2	DS	5 ±	4 ±	Hearn, 1975	Offset Quaternary earth materials.

**DESCRIPTION OF SYMBOLS: DS - Dip slip fault SS - Strike slip fault
DS N - Dip slip fault, normal SS RL - Strike slip fault, right lateral
DS R - Dip slip fault, reverse

Source: Slosson and Associates, Geologic and Seismic Technical Background Report for Seismic Safety Element and Geologic Hazards Portion of Safety Element, General Plan Lake County, California, December 1976.

The amount and severity of ground shaking at a particular location is a function of: (1) the characteristics of the earthquake source--that is, location, magnitude, depth of focus, and geometry of causative fault surface or surfaces; (2) distance from the fault; and (3) the type of geologic formations at the site and between the site and earthquake focus. The intensity of ground shaking can be greatly increased if the earth below the ground surface is characterized by thick deposits of saturated and/or loose sediments, as opposed to well-consolidated bedrock. Table 10 shows the maximum credible earthquake (the maximum earthquake that appears capable of occurring under geologic conditions presently known) and the maximum probable earthquake (the maximum earthquake that, on a statistical basis, will occur during a 100 year interval of time) from faults in the vicinity and within the county.

Intensity of ground shaking is qualitatively measured on the Modified Mercalli intensity scale, as shown in Table 12 (p. 40). This intensity scale is different from the more familiar Richter magnitude scale which quantitatively measures the energy released at the focus of the earthquake. Lake County has largely been spared strong seismic shaking. The largest earthquake to affect the county was the 1906 San Francisco earthquake along the San Andreas Fault, which produced a maximum Modified Mercalli Intensity of VIII in Lakeport and Upper Lake (although comparatively minor damage resulted).

Ground Failure

The third effect of earthquakes is ground failure in the form of landslides, rock falls, liquefaction and other surface and near surface ground movements.

Landslides. Landslides induced by seismic activity present a risk to human life and property located in or directly below hill areas. Earthquake shaking frequently triggers rapid slides on unstable, sloping land. This factor can greatly increase the magnitude of earthquake-related damage, injury and loss of life, disruption of utilities, and blockage of public and private access in or at the base of hill areas. In the event of a major earthquake hitting the county, it is likely that most of the major highways would be blocked.

Land stability is based on the geology and percent slope of the area in question. Most of Lake County consists of hills and mountains with moderate to steep slopes (greater than 15 percent). Many of these sloping areas are underlain by intrinsically unstable serpentine or Mesozoic Franciscan formation rocks. Consequently, in the event of a moderate to strong earthquake, landslides could take place in the hill and mountain areas of the County.

Table 11

ACTIVE AND POTENTIALLY ACTIVE FAULTS WITHIN 60 MILES OF LAKE COUNTY

	DISTANCE FROM LAKE COUNTY (MI)	LOCATION	DIRECTION FROM LAKE COUNTY	MAX. CREDIBLE EARTHQUAKE	MAX. PROBABLE EARTHQUAKE
ACTIVE FAULTS					
Healdsburg	12	Sonoma Co.	SW	6 3/4±	5 3/4±
San Andreas	28	Marin Co. Sonoma Co. Mendocino Co.	W	8 1/2±	8 1/4±
Hayward	46	Contra Costa Co.	S	7 1/2±	7 ±
Concord	47	Contra Costa Co.	SE	7 ±	6 ±
Cleveland Hill	57	Butte Co.	E	7 ±	6 ±
POTENTIALLY ACTIVE FAULTS					
Rodgers Creek	16	Sonoma Co.	SW	7 ±	5 3/4±
San Juan Hills	22	Yolo Co.	SE	6 3/4±	5 1/2±
Tolay	29	Sonoma Co.	S	6 1/2±	5 ±
Sutter Buttes	31	Sutter Co.	E	5 1/2±	4 ±
Bardoli Mountain	32	Marin Co.	S	6 1/2±	5 ±
Green Valley	36	Solano Co.	SE	7 ±	5 ±
Point Reyes	44	offshore, Marin Co.	SW	6 1/2±	4 ±
Seal Cove	53	offshore, Marin Co.	S	7 ±	5 ±
Maacama Fault Zone	[Mapped in Pampeyan, et al., USGS 1961]				

Source and Notes: See Table 10.

Table 12

Modified Mercalli Maximum Intensity
(At Epicenter)

Mercalli Intensity	Common Observation
I-II	Usually detected only by instruments
III	Felt indoors
IV-V	Felt by most people; slight damage
VI-VII	Felt by all; many frightened and run outdoors; damage minor to moderate
VII-VIII	Everybody runs outdoors; damage moderate to major
IX-X	Major damage
X-XII	Total and major damages

Source: California Division of Mines and Geology

Figure 4 shows landslide hazard areas, located generally in the Mt. Baldy area, and areas of existing landslide debris, where surface materials consist of unconsolidated to moderately consolidated slide materials. Landslide areas are highly unstable, and development should not occur on lands composed of these unconsolidated materials.

Liquefaction. Liquefaction occurs when very loosely packed soils rapidly convert to a virtually fluid condition. Liquefaction usually occurs when two conditions are met: the soil is fully saturated (that is, all voids are filled with water) and is exposed to a sudden shock, vibration or shearing strain. This results in a loss of foundation support or the failure of slopes.

The potential for liquefaction is greatest in those areas with soils composed of recent unconsolidated alluvium that contains saturated clay or silt, sand, or gravel. Another factor contributing to potential liquefaction exists in areas where water is near the ground surface. While liquefaction has not been observed in the county, areas of potential liquefaction include most of the valley or lowland areas and 'reclaimed' wetland areas filled with geologically young sedimentary deposits. Detailed studies examining relative sediment density, porosity and cyclic loading experimentation for these areas have not been performed. Much of the City of Clearlake lies in an area designated in the Lake County General Plan as a "liquefaction and seismic soil consolidation Study Zone", as Figure 6 shows.

Location of Alquist-Priolo Special Study Zones

Under the Alquist-Priolo Special Study Zones Act, the California State Geologist is required to delineate special study zones encompassing certain areas of earthquake hazard, and to compile maps delineating such zones. Alquist-Priolo Special Study Zones have not yet been designated in Lake County. However, this does not imply that such zones may not exist.³³ Lake County and the entire west coast of California are active geological zones and are subject to periodic earthquakes. The Uniform Building Code classifies the Lake County as zone 3 (areas subject to major damage, corresponding to intensity VIII and higher on the Modified Mercalli Intensity Scale of 1931).

GEOLOGIC CONDITIONS

Nature of the Hazard

Geologic hazards result from slope failure, subsidence, expansive soils and volcanism. The major geologic hazard facing Lake County are those associated with slope instability. There exist a number of events which, in combination, produce conditions conducive to slope failure:

- Heavy rains and soil saturation plus earthquakes
- Heavy rains and soil saturation plus excavation
- Heavy rains and soil saturation plus deforestation
- Raising of reservoir plus slope undercutting

Many of the geologic hazards such as slope failure are triggered by seismic events and were discussed in the preceding section. This section focuses on geologic hazards not seismically related.

Subsidence

Subsidence is a localized downward movement of ground surface with little horizontal movement. It is usually caused by the collapse of underground voids such as mines or caverns, by excessive groundwater withdrawal, or by extraction of oil. Subsidence can damage all types of construction, including buildings, sewage disposal works, water pipes, sewer lines, gas lines and roads.

Ground subsidence in Clearlake was not reported in the technical background studies completed for the Lake County General Plan, but this does not mean that subsidence has not taken place in the past or will not take place in the future.

The likelihood of subsidence due to the withdrawal of geothermal fluids in the county appears small. No subsidence related to geothermal exploitation has been noted. This may be due to the fact that known geothermal resources in the county are dry steam and relatively deep. As the County's geotechnical specialist points out: "The hot water resources anticipated to occur within Lake County should be deep, several thousand feet below the surface. The rocks containing the hot water are expected to be hard, dense and well consolidated. Thus, subsidence appears relatively unlikely."³⁴

Expansive Soils (Shrink-Swell Phenomenon)

Expansive soils expand in volume when wet and shrink in the process of drying. Structures built on soils having this characteristic may suffer extensive damages when moisture causes the soil to swell and begin to soften. When soil contracts, it pulls away from the structure resting upon it. Consequently, any weight or load exerted upon that structure must be borne by the structure alone, without the necessary support of the underlying soil. Also, when the soil expands in volume, it commonly exerts upward pressures which may amount to two, three, and four thousand pounds per square foot. Because such soils are capable of exerting enormous upward pressures through expansion and because they can lose substantial volume through contraction, structures built directly upon them are subject to severe structural damage. When the soil expands, and subsequently contracts, foundations may crack and buckle, causing walls to crack and to pull away from floors and/or ceilings.³⁵

Volcanism

Volcanic eruptions are among the most violent and destructive manifestations of the earth's internal forces. They can destroy structures, pollute water systems, ruin farmlands, and devastate the natural landscape. The southern half of Lake County is one of the sixteen areas in California identified as likely to experience a future volcanic eruption. Mount Konocti is the most recent, large volcano in the county. Volcanic deposits as "young" as 9,000 years old are known to exist. Further evidence of possible volcanic activity is indicated by the area's well-known geothermal resources, apparently originating in shallow magma (molten rock) chambers. Future eruptions would be expected around the eastern arm of the lake, to the north and east of Mount Konocti, and near High Valley and Chalk Mountain.

Excessive Slope

There exists a direct relation between the degree of slope and associated hazards. In Lake County, soils and geology are complex and create a wide variety of conditions. Simply stated, as slope increases, so does the potential for hazardous conditions to human life and structures situated in the area. Land having an average slope of 30 percent or greater is generally considered less suitable for intensive development because it is difficult and more costly to develop. Also, level or gently sloping lands completely surrounded by broad ranges of steep slopes would be expensive to develop and serve because of access problems. Figure 4 shows areas of Clearlake having a concentration of steep slopes.

POTENTIAL CLEARLAKE RESPONSE TO GEOLOGIC AND SEISMIC HAZARDS

THE CITY SHOULD REDUCE THE RISK TO LIFE AND PROPERTY AND INCREASED GOVERNMENTAL COSTS FROM SEISMIC OCCURRENCES AND GEOLOGIC HAZARDS.

There exists a direct relationship between the degree of slope and the associated hazards on any given soil and geologic situation. In Lake County soils and geology are complex, making for a wide variety of conditions when building. In order to avoid hazards to human life and property, areas in excess of 30 percent slope shall have engineered plans for all construction and grading. These plans shall address roads, utility corridors, etc. as well as off-site problems, such as erosion caused by construction.

Development of lands identified as having high inherent swelling capacity and severe load limitations should be allowed only after site specific soil analysis have been performed which indicate the soils can adequately support the structure.

The siting of residential, commercial, recreational or industrial structures on or adjacent to known or potentially active fault zones should be avoided. Development on lands having soils sensitive to seismic activity should be permitted only after adequate site analysis and appropriate siting and design of structure and foundation. In areas of known seismic hazard, building intensity should be dictated by a scale of acceptable risks as shown in Table 13.

Development should not occur on existing unconsolidated landslide debris (see Figure 4).

The city should cooperate with Lake County in updating all soil related data and policies when current United States Soil Conservation Service study is completed. New information should be continually and immediately added to the technical background data base and if significant changes occur which would affect the General Plan, it should be revised.

Encourage studies by the appropriate state and federal agencies on fault location, activity and seismicity within the area.

THE CITY SHOULD TAKE INTO ACCOUNT THE RELATIVE SEISMIC RISK IN VARIOUS PARTS OF CLEARLAKE AS A GUIDE TO NEW DEVELOPMENT AND HAZARD ABATEMENT OF EXISTING STRUCTURES.

The city should continue to evaluate areas to determine the level of earthquake risk.

The city should consider geologic and seismic criteria in its permitting authority and in determining land use policies and making decisions on development.

The city should adopt development standards to insure adequate public health and safety upon delineation of Special Study Zones by state geologists as required by state law (the Alquist-Priolo Act).

Anchoring of nonstructural elements that could cause damage, injury or loss of life during an earthquake should be encouraged.

Public facilities should be upgraded to meet the risk requirements for seismic safety and be periodically reviewed to determine if and when upgrading is necessary. Existing buildings, particularly critical facilities, that do not meet requirements for seismic safety should be strengthened, abated or downgraded in use in an orderly manner. Priorities for seismic upgrading or phasing out of existing seismically unsafe buildings should be based on hazard to life, occupancy, and the capability of the structure to resist anticipated earthquake effects.

Request federal or state financial assistance to implement the corrective measures required in public facilities.

Table 13

A SCALE OF ACCEPTABLE SEISMIC RISKS

<u>Reason for Risk Level</u>	<u>Kinds of Structure</u>
Failure of single structure may affect substantial populations.	Structures whose continued functioning is critical, or whose failure might be catastrophic: nuclear reactors, large dams, power intertie systems, plants manufacturing, or storing explosives or toxic materials.
Failure of a single structure may affect substantial population.	Structures whose use is critically needed after a disaster: important utility centers; hospitals, fire, police, and emergency communication facilities; fire stations; and certain bridges and overpasses that are part of a critical transportation element; also smaller dams.
Failure of a single structure would affect primarily only the occupants.	Structures of high occupancy, or whose use after a disaster would be particularly convenient: schools, churches, theatres, large hotels, and other highrise buildings housing large numbers of people, other places normally attracting large concentrations of people, civic buildings, secondary utility structures, extremely large commercial enterprises, most roads, alternative or non-critical bridges and overpasses.
Resist minor earthquakes without damage; resist moderate earthquakes without structural damage; but with some structural damage; resist major earthquakes of the strongest experienced in California without collapse, but with some structural as well as nonstructural damage.	The vast majority of structures: most commercial and industrial buildings, small hotels and apartment buildings, and single-family residences.

the Earthquake Challenge, Final Report to the Legislature, of California, by the Joint Committee on Seismic Safety, January Part One: A Comprehensive Approach to Seismic Safety, p. 9.

STRUCTURAL AND WILDFIRE PROTECTION

FIRE PROTECTION SERVICE AGENCIES

City of Clearlake³⁶

The City of Clearlake Fire Department provides fire protection services to all fires within the city limits, and also responds to the intersection of Hwys. 53 and 20. Fires outside the city are the primary responsibility of the California Department of Forestry. The CDF will respond within the city limits if requested.

The Clearlake Fire Department has one full-time fire chief and two full-time mechanics/fire captains, who are assisted by a deputy chief, an assistant chief, eight fire fighters (who also are certified emergency medical technicians) and 36 volunteer fire fighters. At department headquarters, there is one 24-hour crew of dispatchers who dispatch for the fire station at headquarters, Pearce Field Airport and Lower Lake and Middletown/Cobb (which are outside the district). All emergency fire and rescue calls are dispatched.

The department has the following equipment dispersed among the four stations:

- 3 fire engines (2 @ 1,000 gpm, 1 @ 1,250 gpm)
- 3 4-wheel drive brush rigs (for wildland fires)
- 2 tankers (1,200 gal. and 4,000 gal.)
- ambulance squad (1-ton truck with gear)
- medical ambulance

The headquarters fire station, at 14150 Lakeshore Drive in Clearlake, is over 40 years old. The department would like to build a new headquarters station on Olympic Drive if and when funds for that purpose are made available.

California Division of Forestry³⁷

Primary responsibility for fire fighting outside the city limits lies with the California Department of Forestry, which provides protective services to the outlying unincorporated area between May and October (the fire season).

CDF fire stations are located at Middletown, Clearlake Oaks, Kelseyville-Cobb and the Konocti Conservation Camp. There is a helicopter station at Cobb Mountain and there are fire look-outs at Mt. St. Helena and Mt. Konocti. In case of a fire in the Clearlake area, the Middletown and Clearlake Oaks stations would be the first to respond and the Ukiah CDF fire station, an hour further away, would also respond if necessary.³⁸

The CDF stations in Lake County have the following fire staff:

- 2 battalion chiefs
- 2 fire prevention officers
- 4 dozer operations
- 4 look-out personnel
- 11 engineers
- 8 captains
- 24 seasonal firefighters
- 15 Konocti Conservation Camp personnel

FIRE HAZARD

Historically, Lake County has had the highest incidence of Class E fires in California (fires affecting 300 acres or more), though over the past decade the number of large fires has decreased significantly. Steep slope areas with heavy chapparral pose the most extreme hazard. Within Clearlake, the lower slopes of Quackenbush Mountain and Sulphur Ridge present such conditions. Both inside and outside the city, continued growth of brush increases the fire hazard. Fire hazard management practices now include controlled burns to keep fuel levels low.

Within the city, the brush fire hazard, particularly early in September, when strong, dry north winds blow, is aggravated by structural fire hazards and access problems. Many structures in town were built before building codes were imposed; wiring is bad. Many of these poor, pre-1960 structures and mobile homes with aluminum wiring have already burned. The loss potential from fire is greatest in the Chapman Tract area east of Highway 53. The area north of Clearlake Park and west of the walnut orchards, primarily mobile homes, is also hazardous because of the brush. The hills around Borax Lake are also susceptible to fire, a fact which any future development planned for that area would have to take into account.

Illegal burning has been a problem in Clearlake. Prior to incorporation, the CDF issued a number of citations for illegal burning, particularly in the Chapman Tract. Public awareness of burning regulations and enforcement by the city Fire Department has reduced the incidence of illegal burning.³⁹ While legal brush burning is encouraged, there are no funds to actively pursue such a program. Older persons, in particular, need help in clearing grass and brush. This should be done annually (grass cut in May and June, brush cleared in the winter).⁴⁰ Parts of the Chapman Tract (between 18th and 32nd Streets) are very brushy and have difficult fire fighting access. While lots remain undeveloped and uncleared, the fire hazard will remain high.

Many roads in Clearlake are not paved, which makes access by fire fighting equipment difficult. When it rains, only four-wheel drive vehicles can pass over some of the roads. On the unpaved roads, an engine must stay in the hard track of the road where it can be supported. This makes turning and accessibility to structures difficult. Response time is less than 4 minutes to the Chapman Tract from the airport station; it is 9-10 minutes maximum from the more distant headquarters station. West of Highway 53, the average response time is less than 4 minutes, which is considered to be good.

Response time to the Chapman Tract could best be reduced by improving the streets. If substantial new development takes place there (as may happen when the sewer improvements planned by Lake County are completed), a fire station in that area will probably be needed.

URBAN SYSTEMS AND SERVICES

LAND USE

PURPOSE

The purpose of this chapter is to describe the existing and proposed land use patterns in the City of Clearlake and to attend to specific requirements of the State of California concerning the land use element of a general plan.

EXISTING LAND USE PATTERN

Geographic Setting

Small cities like Clearlake occur in isolated and relatively inaccessible areas only with specific reason. In this general region, gold, hot springs or a number of other possibilities could have led to the establishment of a town. In particular, the existence of Clear Lake, a recreation and vacation attraction, combined with the fact that this part of the lake (the "south shore") is considerably more accessible to the population centers of the Sacramento Valley (Sacramento is 100 miles to the east) and the East Bay of San Francisco region (Oakland is 100 miles to the south) to provide reason for development at this location. Clearlake had its origin in the 1800s as a summering place on the edge of the largest fresh water body in the State of California.

The "attractive" factors in Clearlake's situation - lake, climate, rural setting, relative isolation, slow pace - have continued to encourage growth. Rapid expansion, however, has been impeded by lack of quick and easy access, limited job opportunities and a "narrow" economic base depending almost entirely on tourism.

City Form

The two most important natural elements in the physical form of the City of Clearlake are the lake and the slope of the land from the lake. The city is generally confined by a ridge of hills on the north and east (Sulphur Bank Ridge, Bald Mountain, Schoolteacher Hill) and by Cache Creek and the marshlands on the south. The lake is to the west, with views of Mt. Konocti on the western shore of the lake dominating virtually every vista from the city.

Development is concentrated on the flat land along the lakerront, extending north and south along the shore and back (away) from the lake as the terrain permits. The original recreation uses and seasonal visitor housing bordered the lake shore, along a bay in the shape of a reversed C. The more permanent residential uses and the commercial uses clustered just about midway on the back side of the C, where the amount of flat land is most extensive. Beyond that, reflecting both the fertile soil of the Burns Valley Creek basin and the shape of the terrain, agricultural uses developed away from the shore toward the northern ridge. There is also residential development on filled marshlands in the southern part of the city toward Cache Creek, the Highlands Harbor area.

A notable feature of the area, not readily visible and in fact undeveloped to this point, is Borax Lake, an area lying between Sulphur Bank Ridge and the hill on the north edge of the lake's bay. Borax Lake is almost entirely surrounded by hills, with oak groves sloping down to the marshy areas. This area and the Bald Mountain area are two sizable areas with potential for development. They have been designated as Special Study Areas on the General Plan Map and are discussed in the Housing Technical Background Paper.

Well over half of the land within the city limits is vacant land. Most of it is in the form of existing, undeveloped subdivisions - paper subdivisions created in the 1920s. See Housing Technical Background Paper (p. 77-79) for discussion of vacant residential land.

The principal man-made feature in Clearlake's form is State Route 53 which runs north to south generally demarking the end of the gradual slope up from the lake and the beginning of the uplands to the east. Development on the east side of the highway is almost entirely residential. Together with a road loop extending from State Highway 53 toward the lake (Lakeshore Drive), along the lake (Lakeshore Drive) and then back again toward SR 53 (Olympic Drive), the spine formed by SR 53 is part of the basic transportation pattern affecting Clearlake. (See the Transportation Technical Background Paper for further discussion.)

Entrances

Clearlake is generally entered by automobile from SR 53. From the north, five miles south of the intersection with State Route 20 (east-west), SR 53 comes over the low point of the Sulphur Bank Ridge and provides a panorama of the town and Clear Lake before it settles into the upland boundary. From the south, through the open valleys between the Napa Mountains and the ridges around Clearlake, SR 53 crosses Cache Creek into the city. Just before crossing Cache Creek, the highway offers to the northwest a full view of the marshlands of the newly designated State Park, Anderson Marsh. On the city side of the creek, although the airport can be seen to the left and a cluster of non-residential buildings to the right (Redbud Community Hospital, Southshore Center for Lake County, Yuba College building, a propane gas storage yard and so on), there is actually very little to indicate the city until the intersection with 40th Avenue/Lakeshore Drive, where signs indicate the lake, lodging and services to the left (west). There are in fact only a few intersections with SR 53 and only this one gives any evidence of leading to anything.

A notable entrance to Clearlake is from the lake itself, to the public boat ramp in Redbud Park and to private docks along the waterfront. In past eras, when there was a considerable amount of cross-lake traffic between resorts of the north shore, the City of Lakeport and the resorts of the south shore, there were several large private docks for customers of lakeshore restaurants. One has recently been redeveloped and may indicate that the lakeshore will re-emerge as an entrance to the town.

Developed Uses in Clearlake

Recreation and Tourism. The location of recreation and tourism in Clearlake which includes commercial residential uses and most commercial uses relates directly to the water. Recreation and visitor services and accommodations are centered in the downtown area, generally defined as the area between Redbud Park (on the south) and Austin Park (on the north) along both sides of Lakeshore Drive. The two parks provide facilities for water access, picnicking, children's play and active sports.

Motels and cottages extend north of Austin Park along the lakeshore, intermingling with private residences and ending in a small neighborhood center at Clearlake Park. To the south of Redbud Park there is a residential subdivision and south of that, a cluster of trailer courts on a long narrow, one-third acre to three acre lots with lake frontage. These once served as visitor accommodations, now as permanent and semi-permanent housing.

There is, in addition to the lakeside recreation and tourism, a cluster of trailer parks and campgrounds along the north side of Cache Creek, between the SR 53 bridge and the marshes at the entrance to the lake.

Civic and Office Uses. There are two main centers of civic and office - or public and semi-public - uses in Clearlake. The first is in the downtown area. Until recently, the fire station, a bank, the main post office and City Hall were located in a three-block area downtown. The Burns Valley Elementary School, adjacent to Austin Park and used for many civic activities, is about five blocks away. The cluster has grown up, in a manner of speaking, appurtenant to the major commercial activity - tourism. As commercial and tourist activities expand in this downtown area, there is some pressure to relocate civic uses, not only to make the land available, but to make the civic uses more accessible to residents. The fire station recently relocated to Olympic Drive, near a large shopping center and with more direct access to developing portions of the city (the shopping center, the residential areas on the other side of SR 53, etc.).

The second area is around what is called the Southshore Center, named after the Lake County branch offices located there. This area on the east side of SR 53, north of Cache Creek, now has limited access from the highway. Redbud Community Hospital, Oak Hill Elementary School, a branch of Yuba College and the offices of the Konociti Unified School District are located here. There is some acreage to expand - the apparently tracted area to the east is largely undeveloped. Improvements to the Frontage Road are proposed as part of a major subdivision already approved for the lands between Dam Road on the south and 7th Avenue on the north.

A library, the other semi-public meetings halls such as the Senior Center, the Elks Lodge and bank with a community meeting room are clustered within several blocks of each other near Redbud Park and along that portion of Lakeshore Drive close to Redbud Park. A new state park, Anderson Marsh, has been acquired and the state will prepare a development plan for it; the city intends to participate in the planning.

Commercial. General commercial uses (as opposed to visitor or recreation or residential commercial uses) are clustered in two major locations. The first is the commercial strip along Lakeshore Drive between SR 53 and Old Highway 53 (which parallels SR 53 approximately one-half mile to the west, toward the lake). The Highlands Center here serves primarily residents of Clearlake, although recently constructed uses include fast food places ordinarily geared to the tourist trade. There is a postal box facility in the Highlands Center.

The second is the Burns Valley Mall, a shopping center located on Olympic Drive at the intersection of Old Highway 53. Not yet completed, the mall will be the primary community commercial center for Clearlake. Safeway has relocated here from its old location at Lakeshore Drive and Olympic Drive. Construction of a two-screen movie theater, the first in Clearlake (and in Lake County outside of Lakeport), has been approved for a location adjacent to the mall.

In addition, there are two other small neighborhood-scale centers in Clearlake. One is on Lakeshore Drive, at its intersection with Sulphur Bank Drive (the route to Borax Lake at the north end of town). The other is Old Highway 53 near Konocti View Avenue. There are a few scattered commercial uses elsewhere in the community, including a small store in the residential area east of SR 53.

Light Industry/Storage. There is virtually no industry in Clearlake. Industrial or heavy commercial types of uses such as propane gas distribution centers, lumber yards, or storage facilities, and a cement batch plant are scattered around the community more by chance of land ownership than by rational criteria. The Pearce Airfield area has characteristics that may suit it for light industrial uses, but the primary use of the airfield at present is for recreation and tourism.

Agriculture. Agricultural uses occur in the outlying portions of Clearlake. There are large tracts of walnut orchards in the Burns Valley Creek basin, north of Olympic Drive and extending to Borax Lake. In the southeast portion of the city, out Dam Road north of Cache Creek, is a vineyard area.

Vacant land. Over half of the land in Clearlake is vacant. Most of it is in tracted subdivision parcels. Large undeveloped areas include Borax Lake, the marshes near Cache Creek, and the Bald Mountain area. See the Housing Technical Background Paper (p. 61) for a description of the vacant land and its potential as a housing resource.

Summary. Table 14 (p. 55) summarizes the existing distribution of land uses in the City of Clearlake.

Table 14

LAND USE IN THE CITY OF CLEARLAKE
AS OF SEPTEMBER 1980

<u>Land Use Category</u>	<u># of Acres</u>	<u>% Distribution</u>
Developed Residential	1,441	21.4
Stick-built	781	11.6
Mobile home	606	9.0
Multi-family	54	.8
Commercial Residential	40	.5
Commercial	83	1.2
Public/Semi-public	90	1.3
Orchard/Vineyard	490	7.3
Light Industry/Storage	22	.3
Park/Open Space	50	.7
Total Developed Land	2,216	32.7
Vacant Land	4,505	67.3
Total Land Area	6,720	100.0

Source: Estimate drawn from existing city land use map by NBW Associates, July 1982.

PROPOSED LAND USE PATTERN

The General Plan Map proposes a pattern of land uses in the City of Clearlake based on 1) general trends in the economy of the area and population growth and 2) the goals and objectives of the Clearlake community.

Economic Trends and Population Growth

The Housing Technical Background Paper (p. 61) contains information on economic trends in the Clearlake area and projects the population of the City of Clearlake to 1993. The primary economic activity in Clearlake will continue to be recreation and tourism; no fundamental change in economic activity is projected to take place. The population of Clearlake is projected to grow from about 9,500 in 1983 to a population of 13,000 in 1993, an increase of about 3,560 people, or approximately 1,470 households.

Intensifying Land Uses

The generally underdeveloped character of the existing land uses permits increasing the actual density and intensity of use on any given site without having to allocate additional acres to a specific type of use. Table 15 shows the distribution of land uses proposed in the General Plan. The categories in this table do not correspond directly to the categories of existing land use presented in Table 14 (p. 55) but instead correspond to the land use designations on the General Plan Map. Several observations can be made:

- the overall pattern remains the same;
- residential uses predominate;
- vacant land in tracted subdivisions appears as residential infill.

A direct comparison of the figures in Tables 14 and 15, prepared for the EIR on the General Plan, appears in the Housing Technical Background Paper as Table 26 (p. 79).

Table 15

PROPOSED LAND USE OF THE CITY OF CLEARLAKE CLEARLAKE GENERAL PLAN

<u>Land Use Category</u>	<u># of Acres</u>	<u>% Distribution</u>
Visitor Services	44	.5
Visitor Accommodations	58	.7
Mixed Designations	153	2.3
Parks	282	4.3
Special Study Areas	545	8.6
Managed Development Areas	1,571	23.8
Civic/Office Uses	89	1.3
Industrial	204	1.4
Commercial	108	1.0
Agriculture	47	12.8
Residential	3,619	43.3
Very Low Density	794	5.3
Low Density	584	25.3
Medium Density	2,241	12.7
Total Land Area	6,720	100.0

Source: NBW Associates, April 5, 1983

The tabulation of land availability produced an estimate of approximately 7,640 undeveloped lots in residential areas. The degree to which infill development will take place on these parcels will depend in part on whether major new developments on a few large tracts take place. The policies of the General Plan allow for either pattern of residential development.

Land Use Designations

The proposed land use patterns of the Clearlake General Plan are contained in the Policies and Programs text and are presented by chapters: Recreation and Tourism; Resource Protection and the Environment; Community Appearance; Commerce and Industry; Transportation; and Housing. The General Plan Map brings together all of the map-related objectives, policies and programs of the Clearlake General Plan. Other policies and programs which cannot be reflected on the map, but which regulate the permissible land uses, are described in the text. These policies and programs are implicit in the following land use designations of the map:

Visitor Services. This land use designation is applied to the downtown area which is the focus for recreation and visitors and is intended to encourage the development of restaurants, hotels, motels, cafes, small retail stores and similar uses.

Visitor Accommodations. This category is applied to those areas which are appropriate for a variety of visitor lodgings but which are not intended to include other visitor services.

Mixed Designations. Mixed land use designations are applied to several areas in which both resident and visitor needs are served. These designations intermix visitor services with other commercial uses, or visitor accommodations with residential uses. Mixed use is intended to promote attractive and functional combinations of development.

Parks. This land use designation indicates existing and possible future public park and recreation areas.

Special Study Areas. This designation is provided for one area within the city - Borax Lake - and one area outside the city within the city's sphere of influence - the Bald Mountain area (the Clearlake Hotel and Resort Company property). It is used to recognize that further study should be conducted of these areas before any specific designations for conservation or development are approved. Issues to be addressed in these areas include: slope stability, access, drainage, scenic value, potential contribution of Clearlake's open space, recreation, agriculture, employment and housing needs.

Resource Protection Areas. Hill-sides, creeks, marshes, wildlife habitats, hazard areas and similar areas are valuable as open space and contribute to the rural character of Clearlake. Subdivision and development of these lands must respect environmental constraints and resources.

Civic/Office Uses. The area of the existing City Hall, in the vicinity of Howard and Pearl Streets, now serves as the town center. Two alternative sites that could be considered in the future are:

The area around Burns Valley School which could be developed with civic uses, including city offices, other professional and administrative offices, museums and an auditorium. Austin Park could be extended to include the Burns Valley School site.

The Southshore Center area, which could be expanded to include the Redbud Community, Yuba College, the Oak Hill School, the Konocti Unified School District offices and surrounding vacant land. Suitable uses in this area could include professional and administrative offices, auditoriums, museums and parks.

Industrial. This designation is applied to existing and potential sites for future development with light and heavy industrial use.

Commercial. This category allows for a range of general commercial uses.

Agriculture. This designation is applied to lands intended for exclusive agricultural use.

Housing. The housing land use categories are intended to allow infill in existing parcels in areas where the majority of lots are developed and encourage merger of lots where many lots are undeveloped. Three density categories have been specified.

Very Low Density Residential. This category is applied to the few areas in the city where there are existing large lot subdivisions. The permitted densities require one-and-one-fourth acre to ten acres of land per dwelling unit.

Low Density Residential. This category includes most of the lower density subdivisions which make up the bulk of the residential development pattern in Clearlake. The allowable density ranges from 5,000 square feet per dwelling unit to one-and-one-fourth acre per dwelling unit.

Medium Density Residential. This category applies to existing subdivisions where substantial development has already occurred and infill of existing lots served by water, sewers and paved roads is planned. Allowable densities range from 4,000 square feet to 5,000 square feet per dwelling unit.

Housing development may also be allowed in Resource Protection Areas if environmental constraints are properly observed.

Densities

The "action" section of each chapter lists the appropriate zone districts to implement the land use designations. The residential designations and districts in the Housing chapter specify the density ranges allowable. Densities for recreation, tourist, commercial and industrial uses are a function of minimum lot size, set-backs, height, access and parking requirements established in the zoning ordinance.

STATE REQUIREMENTS

According to the State General Plan Guidelines, the land use element of the General Plan "designates the proposed general distribution and general location and extent of the uses of the land for housing, business, industry, open space, including agriculture, natural resources, recreation, and enjoyment of scenic beauty, education, public buildings and grounds, solid and liquid waste disposal facilities, and other categories of public and private uses of land". The element shall:

"include a statement of population density and building intensity recommended", and

"identify areas . . . subject to flooding and shall be reviewed annually with respect to such areas".

The previous sections of this chapter have addressed the first requirement. Information on areas subject to flooding in the City of Clearlake is presented in the Technical Background Paper: Flooding and Floodplains (p. 21) and a map of inundation areas is included as Figure 2. Areas subject to flooding have been included in the Resource Protection Land Use category. Development in floodways is prohibited. Development in floodplains (as well as in marshlands and steep slopes) is discouraged. Existing lots in floodplains may be developed provided flood hazards can be mitigated.

The floodplain portion of the Resource Protection use designation is based on existing floodplain conditions. The Storm Drainage Master Plan for Burns Valley Creek Watershed, now under study by the City of Clearlake, identifies improvements to the system to prevent flooding. In the event that recommended improvements are completed, the configuration of the floodplain may change and as a result the General Plan Map designations could be amended to reflect the changes in the floodplain and potentially allow for more intensive residential development.

In the interim, factors such as additional development in the watershed are likely to affect the flood potential and need to be monitored on a regular basis. The environmental review process required by the General Plan will provide the opportunity for project by project review, and the General Plan update process will also provide for regular periodic reviews.

HOUSING

PURPOSE

The Housing Element Requirement of State Law

Housing elements have been required in California general plans since 1969.¹ In support of the state goal of decent housing for all, the State's Housing Element Guidelines set forth three objectives the housing element should address:

- The provision of decent housing in a satisfying environment for all persons regardless of age, race, sex, marital status, ethnic background, source of income or other arbitrary factors.
- The provision of adequate housing selection by location, type, price and tenure.
- The development of a balanced residential environment with access to employment opportunities, community facilities and adequate services.

Following the adoption of a housing element by the Clearlake City Council, Assembly Bill 2853 mandates that the element be updated at least every five years. Review and revision should occur more frequently if local conditions warrant. A yearly evaluation of major changes should be incorporated into the General Plan Annual Report which each local planning agency must file with its governing board (Government Code 65400(b)).

It should be noted that the City of Clearlake is considered by the State Department of Housing and Community Development as a distinct and separate market because of its remote location in a rural area. Local housing policies are unlikely to impact a larger regional market. Therefore, the requirement that the city include a fair share of the region's housing market needs is not applicable.

The other elements of the city's general plan will rely on important population, housing and employment information found in the housing element, as well as policy perspectives on housing. In particular, the policies and implementation measures of the housing element are closely coordinated with those of the land use and circulation elements.

An Overview of Clearlake's Housing

Most of Clearlake's housing units are single-family, owner-occupied units. Mobile homes form a large part of the housing stock. Overall, home values and rents are low but housing conditions are good. Vacancy rates for year round units appear to be comfortable, and many housing units are only seasonally occupied. In residential areas, there is a low level of urban infrastructure (such as sidewalks). Traditional suburban-type housing is totally absent in Clearlake, which is a rural town historically oriented toward lake resorts, summer cottages and retirement homes.

Table 16 shows the estimated year round housing units for the City of Clearlake for 1980 and the number of occupied units.

Table 16

Year Round Housing Units in City of Clearlake,
1980 Estimate³

	<u>Total</u>	<u>Occupied</u>
Housing units in nine enumeration districts (EDs) lying wholly within city boundaries	3,557	2,538
Housing units in 3 EDs partially within the city, but with 99 percent or more of housing units believed to lie within city boundaries	1,306	781
Estimated city housing units, 1980	4,863	3,319

Source: Mundie & Associates based on 1980 Census data for 12 Lake County enumeration districts: 92-99, 102-104, and 110.

EXISTING HOUSING STOCK

Clearlake had 2,345 single family dwellings in 1980. When added to the 2,039 mobile home/trailer units, 4,384 of the 4,863 units (or 90%) were single-family units. Of all occupied year round units, 73% were occupied by homeowners. This compares to a statewide owner-occupancy rate of 56%.

Mobile Homes Form Large Portion of Housing Stock

In 1980, Clearlake had approximately 2,039 mobile homes comprising about 42 percent of the city's housing stock. Comparable figures for other areas include 30 percent mobile homes in Lake County and 4.5 percent in the State of California. The high percentage of mobile homes in Clearlake results primarily from building activity in the 1970s. In Lake County as a whole, and in its unincorporated areas, the mobile home share of the total housing stock more than tripled between 1970 and 1980 from about 9.5 percent to over 30 percent.

Key Housing Indicators Do Not Suggest a Severe Housing Problem

Clearlake's housing appears to be in good condition. Few units lack plumbing facilities, and the proportion of overcrowding is low. The proportion of substandard units/units needing rehabilitation is probably around ten percent. These condition questions are discussed in greater detail in the presentation on housing needs later in this chapter.

Home prices are low (1980 median = \$41,400) as are rents (1980 median = \$171/month), figures that are well below averages for the state (1980 median value for noncondominium units = \$84,700; 1980 median monthly rent = \$253).

Vacancy rates appear to be comfortable. In 1980, about 32 percent of year-round units were vacant; vacant-for-sale and vacant-for-rent units represented almost seven percent of year round units.

Many Housing Units Are Seasonally Occupied

In 1980, 68 percent of Clearlake's 1,544 vacant housing units (or 1,050 units) were reported as "held for occasional use". This is 21.6 percent of all Clearlake's 4,863 year round units, compared to 1.3 percent for the state. Another 663 units were classified as "seasonal" and were not occupied at the time of census. Thus approximately 1,713 of Clearlake's housing units may be considered secondary housing, about 31 percent of the total unit count of 5,526 in the 12 EDs analyzed.

Low Level of Urban Infrastructure in Residential Areas/ Traditional Suburban-Type Housing Totally Absent

The historic development of Clearlake as a tourist and retirement area with a rural character has meant that relatively little investment has been made in public infrastructure and amenities. To some degree, Lake County's failure to impose development standards has contributed to the city's present low level of residential amenities: paved streets, sidewalks, storm sewers, street lights and neighborhood parks are notably absent in most residential areas of Clearlake. Well-planned residential subdivisions of the kind prevalent in California's suburban communities are totally lacking in Clearlake.

CHARACTERISTICS OF RESIDENTIAL LAND

Clearlake Is Primarily a Residential Community

Clearlake's residential character has attracted many people to the area. Developed residential land accounts for approximately 21% of the total land area of the city, or 65% of the total developed land. Commercial residential, such as motels, accounts for an additional 0.5% of the city's land area, or 2% of the total developed land.⁴ The lack of developed industrial areas, and the presence of large areas of open space (both land and water), give further emphasis to the community's residential qualities.

Residential Development Is Low-Density and Scattered

Clearlake had approximately 5,526 dwelling units (both year round and seasonal) in April 1980. With 1,441 developed residential acres in September 1980, the overall average residential density was less than four units per acre. The pattern of dispersed development that has occurred in some parts of Clearlake in large measure accounts for the fact that 67% of the city's land is vacant. In the area east of State Route 53, it appears that many of the best lots have been developed with homes, while others without views and/or in ravines, or further from existing roads, have not been. These undeveloped lots, many of which are small (75' x 100'), may never be fully built out.

Two Undeveloped Areas Exist That Could Accommodate Large-Scale Development

The Borax Lake area, in the northwestern corner of Clearlake, represents one opportunity for future development, and the uplands north of Burns Valley is another. Both of these large areas (in the first case amounting to 1,000 acres total, and in the second amounting to 2,300 acres considered by the owner to be developable)⁵ may be feasible for new residential (and other) development.

The Desirability of Undeveloped Residential Land Varies Widely

Many parcels are without hook-ups to water and sewer systems, while others have services. Many parcels offer the potential for lake and/or hill views, while others are in ravines. Some have poor road access. Finally, commercial uses have been established in many primarily residential areas, and land use compatibility problems make it difficult to estimate the proportion of undeveloped housing parcels that are suitable for housing or that have a high likelihood of being developed for housing. This issue is discussed further in the section on Housing Opportunities, p. 77.

HOUSING DEMAND

Recent Population Growth Has Been Rapid and Generally Continues Existing Trends

Clearlake and Lake County continue to attract immigrants, among them retired persons, persons receiving public assistance, and workers attracted by employment opportunities in the Geysers-Calistoga KGRA (known geothermal resources area). As the population has expanded, there has also been an increase in retail, service and government employment. Clearlake has experienced recent rapid population growth. The population of Clearlake as of April 1980 was about 8,600.⁶ As of January 1, 1982, the population was estimated by the State Department of Finance to be 9,200, and by January 1, 1983, to be 9,400 (or an annual growth rate of about 3.5 percent).

The Konocti Unified School District (KUSD), which includes the City of Clearlake, has recently experienced enrollment in excess of capacity. The district is operating with 56 temporary portable classrooms. The

additional childbearing-age/working age persons moving into the area and the fact that baby boom era women are now having children have contributed to increases in school-age population. The district is also affected by grandchildren living with retirees and by families on public assistance.⁷ Since 1975, enrollment has increased from 1,044 to 2,374 in 1982, or 127 percent (about 12.5 percent per year).⁸

Another indicator of recent rapid growth is the number of requests for post office boxes in Clearlake. There is no home mail delivery in the town or surrounding area, though there is some delivery service along a highway contract route. From August 1981 to August 1982 there was a net increase of approximately 500 mail boxes rented and approximately 100 net additional stops on the contract route within the City of Clearlake. Also, the Clearlake Park Post Office currently has a waiting list for about 40 post office boxes.

Retired Persons Form a Large Proportion of Local Residents

In Clearlake, approximately 44 percent of the city's residents were over 55 years of age in 1980 (see Table 17). This compares to 39 percent for Lake County. Clearlake residents 65 years of age and older accounted for 26 percent of the total, compared to 22 percent for the county and 10 percent for the state.

Table 17
Age Distribution
of Clearlake & Lake County Population, 1980

<u>Age Group</u>	<u>Clearlake</u>		<u>Lake County</u>	
	<u>Number</u>	<u>% of Total</u>	<u>Number</u>	<u>% of Total</u>
0-14	911	16%	6,432	18%
15-19	355	6%	2,392	7%
20-24	246	4%	1,880	5%
25-34	625	11%	4,665	13%
35-44	399	7%	3,394	9%
45-54	523	9%	3,602	10%
55-64	980	18%	6,041	17%
65-74	1,022	18%	5,459	15%
75-84	399	7%	2,027	6%
85+	69	1%	474	1%
Total Population	5,529*		36,366	100%

*Population age tabulation based on nine EDs wholly within the city.

Source: Clearlake figures tabulated by Mundie & Associates; county figures from U. S. Census, 1980.

Over the past decade the county has exhibited a rapidly increasing school age population, an increase in parent-age population (20-39 years old), a steady middle age population (40-54 years old) and a large older adult population (55-85 years old). The median age was 49.4 years for Clearlake and 43 years old for the county, compared to 31 years for all California residents.¹⁰

Low-Income Persons Form an Important Share of Total Population

Both Clearlake and Lake County have a lower median income level than the 1980 state median of \$18,248. Clearlake's median household income was \$8,360, with Lake County's at \$11,172. Local low income levels can be partially explained by the large retirement population living on fixed incomes as well as an unemployment rate higher than the state average. In 1979, 6,950 Lake County households (45 percent) received Social Security payments.¹¹

Among the retired population, low income may be a poor indicator of actual assets. Retired persons may have been able to sell a home for profit elsewhere, buy a less expensive home in Clearlake, and use the proceeds as a supplementary source of income. There is no information available, however, to document the degree to which this situation exists in Clearlake. Among the total Clearlake population, about 18 percent had incomes below the poverty level in 1980.

Unemployment rates in Clearlake and Lake County are high compared to state levels, and vary considerably over the period of a year, primarily due to the seasonal nature of employment in tourist-serving businesses. Unemployment in the county was 16.3 percent in March 1982, well above the state level of 9.4 percent.

Economic Growth in the Region Is Contributing to Local Housing Demand

The entire southern Lake County area has experienced rapid population growth in recent years, attributed primarily to continuing retirement and second home development and increasing geothermal development and associated employment in construction, utilities and support sectors. While the Lower Lake-Middletown county census division experienced the greatest percentage gain (105.8%) from 1970 to 1980, the Upper Lake-Clearlake Oaks Division (which includes Clearlake) experienced a 66.3% increase (about 3,248 persons).¹³

It is difficult to estimate total Lake County employment because many geothermal workers who are actually working in Lake County are reported as being employed elsewhere (primarily in Sonoma County, which serves as the base of operations for many of the geothermal exploration enterprises). Construction companies doing work in the Geysers-Calistoga Known Geothermal Resources Area (KGRA) tend to report employees as working in Sonoma County because it is difficult to determine in exactly which county geothermal workers are working, and because most plant construction is in Sonoma County.¹⁴ There are currently 15 electrical generating power plants in the Geysers-Calistoga KGRA. Lake County geothermal power plant activity is increasing, with one plant currently on-line, four plants under construc-

tion, and an additional plant planned for operation in 1985. As is typical of major construction projects, permanent employment opportunities are low compared to construction employment levels. About six workers are required to staff a completed plant at the Geysers.¹⁵

An informed survey of residents and business people in the Middletown/Anderson Springs area in southwestern Lake County seemed to indicate a local belief that the growth in this area of Lake County was related to geothermal development. A September 1980 survey of students in the Middletown Unified School District showed that the parents of one-third of the students in that district were employed in geothermal-related industries and services.¹⁶

The proposed Homestake McLaughlin Gold Mine would create approximately 250 permanent jobs for mine employees who would reside primarily in southern Lake County. Like geothermal development, mine employment would be considerably higher during the construction phase, with as many as 720 employees during the peak construction period.

HOUSING NEED ANALYSIS

To meet future housing need, the available supply of housing must expand to accommodate projected growth, to compensate for removals from the housing stock, to allow for a comfortable vacancy rate, and to provide housing choice for those seeking to change units, whether because of changes in their housing needs or because of substandard housing conditions.

Projected Growth

Forecasting Clearlake's future population is a task made difficult by the city's relative isolation from more economically-developed areas. In regions such as the San Francisco Bay Area, population forecasts can be well-grounded in knowledge of the regional economy and of national patterns of industrial growth and decline, which lend themselves to accurate prediction. In Lake County there are few "predictable" elements in the economy, and consequently there is little substance on which to build a sophisticated forecast.

In such circumstances, a simple projection of growth trends, adjusted according to the analyst's knowledge of the factors influencing growth, is usually the best approach. This is basically the approach used by consultants to Lake County in developing the county-wide population projections which appear in the county's General Plan. That document points out that the sustaining of steady growth depends upon Lake County's maintaining its appeal to retired persons and on the county's ability to attract some new basic industry over the projection period.

These observations apply to the City of Clearlake as well, where availability of urban services (schools, a hospital, stores and more concentrated public safety services) should help the city maintain its share of total county population.

Clearlake was not an incorporated city in 1970 or in April in 1980 (when the most recent federal census was taken), so there is no extensive historical record of population within city boundaries. Past rates of growth in the county are presented in Table 18.

Table 18
Lake County Population
1950 to 1980

<u>Year</u>	<u>Count</u>	<u>Annual Rate of Growth Since Preceding Count</u>
1950	11,480	-
1960	13,786	1.85%
1970	19,548	3.55%
1980	36,366	6.40%

Source: U. S. Census

During the 1970s, Lake was one of California's most rapidly-growing counties in terms of its 6.4% annual growth rate, although the numerical population increase (16,818) was not large in comparison with more urban areas. Over time, continuation of the same level of growth in terms of number of new residents results in a gradually declining growth rate, as the population base on which the rate is calculated continues to rise.

What can radically alter future growth in Lake County would be a major change in economic base: one (probably more) large new employment centers in a given industry, the development of spinoff and support enterprises and the expansion of the service sector (retail, personal/professional/business services and government) to support new population growth. Growing communities may eventually reach a "take-off" level beyond which the local economy is sufficiently large, varied and integrated that the prospects for continuing growth are excellent given a healthy national economy.

Clearlake is neither large enough, nor economically diverse enough, to fit that healthy growth description at this time. While many forces are propelling small rural counties into the growth stream, it is far too early to tell when - or whether - growth in Lake County will begin to be, to a degree, self-perpetuating. For this reason, the most sensible approach to a population projection for Clearlake would reflect both the relatively high growth rate of recent years and the likelihood that, absent dramatic change of the kind described in the preceding paragraph, the present rate will taper off in the future. This approach is reflected in the projection of Clearlake's future growth set forth in Table 19 (p. 69).

Table 19

Projected Population
of the City of Clearlake
to 1993

<u>Year</u>	<u>Clearlake Population</u>	<u>Lake County Population</u>	<u>City's Share of Lake County Population</u>
1980	8,600 (estimate)	36,366	24%
1982	9,243 (estimate)	40,723	23%
1983	9,453 (estimate)	42,693	22%
1988	11,255 (projection)	49,246	23%
1993	13,010 (projection)	52,733	25%

Source: 1980 estimates are U.S. Census (for county) and derived from U.S. Census enumeration district tabulations (for city; see note 6). Estimates for both county and city for 1982 and 1983 are from the California Department of Finance and have been adjusted to April 1. Lake County projections are interpolations of figures presented in Lake County General Plan, Table IV-2. Clearlake projections are by Mundie & Associates based on an annual 3.5 percent growth rate (the apparent present rate) to 1988 and a 3.0 percent rate thereafter.

Population growth during the five-year period ending in 1988 is projected to be 1,772 people, translating to approximately 731 households, or 146 households per year.*

Overall Housing Need

Clearlake will require additional housing units to accommodate households moving into the city, to compensate for removals, and to allow for sufficient vacancies that mobility will not be greatly restricted. Table 20 (p. 70) sets forth an estimate of net total need amounting to 649 units, 437 owner units and 212 renter units.

*Assumes one percent in group quarters, and 2.4 persons/household.

Table 20

Projected Need for Year Round Housing Units:
Five Year Period Ending 1988

Gross Total Need Calculation

Projected 1988 population, total	11,225
Population in households ¹	11,113
Total number of households ²	4,630

Units Needed By Tenure Class³

	Owner (73%)	Renter (27%)
Tenure Distribution	3,380	1,250
Vacancy Allowance	+2%	+6%
Gross Need	3,448	1,325

Existing Stock Available to Meet Future Need

Year round units, total in 1980 ⁴		4,863
Year round units available for full-time occupancy ⁵		3,813
Added to primary housing stock since 1980 ⁶		332
Total primary housing stock, 1983		4,145
Permanent occupancy units by tenure	3,026	1,119
Less removal allowance (0.1%/year)	(15)	(6)
Existing units in stock for permanent occupancy, 1988	3,011	1,113

Net Total Housing Need, Five Years Ending 1988

Gross need by tenure	3,448	1,325
Existing units to be available	3,011	1,113
Net need by tenure category	437	212
Net total need		649
Annual need ⁷		130

¹Assumes 1% institutional population.

²At 2.4 persons/household (the 1980 Lake County average).

³Corresponds to approximate tenure breakdown of occupied units in 1980.

⁴From Table 16 (p. 62).

⁵Approximately 21.6% of Clearlake's year round units in 1980 were reported as "vacant-held for occasional use". Most of these will remain occasional use, secondary housing units in the next five years.

⁶At an annual rate of 154 units times 2.75 years, less 21.6 percent assumed to be secondary units.

⁷This estimate of annual need, 130 units, is lower than the number of new households in the market annually (146) primarily because the overall vacancy rate of primary units in 1980 was higher (almost 13 percent) than the overall vacancy rate (approximately 3 percent) allowed for in these estimates. In other words, if vacancies were as numerous in 1980 as was reported, some of the 1980 to 1988 growth will be taking up slack in the 1980 supply and will not require new additions to the stock.

Source: Mundie & Associates

Detailed Need Assessment

The Current Rate of Total Housing Provision Appears to Meet Net Need • The preceding analysis shows that provision of approximately 130 units per year is needed to meet net housing need, including new households, vacancy allowance and adjustment for removals. An annual need of 130 units is less than Clearlake's current rate of net housing production,* as shown in Table 21.

Table 21

Additions to Clearlake Housing Stock 1981-1983

	<u>Single Family</u>			<u>Multifamily</u>	<u>Total</u>
	<u>Stick-built</u>	<u>Manufactured</u>	<u>Total</u>		
July 1981- June 1982	25	79	104	72	176
July 1982- December 1982	13	62	75	0	75
January 1983- March 1983	3	16	19	0	19
Annual Average	23	90	113	41	154

Source: Clearlake Planning Department

Recently-added Units Match City's Tenure Distribution • The historic tenure breakdown is about 73 percent ownership units and 27 percent rental units (Table 20, p. 70). The units added to stock since July 1981 included 72 rental units in a single multi-family project making the minimum proportion of rentals among all units added since July 1981 26 percent. That project, financed in part by the Farmers Home Administration (FmHA) will offer subsidized rent levels to qualifying households.

Other rental projects in the approval process promise to maintain or increase the rental share of the total housing stock. A market project called Nut Tree Village has completed the CEQA process and was issued a use permit in spring 1983; it will contain 92 units. A 56-unit project by the Rooftree organization called Clearlake Commons, approved for FmHA financing, is planned for a site on Old Highway 53; it will be rented to low income families. The City of Clearlake has worked closely with the developers of both these projects, and submitted letters in support of the subsidized project.¹⁷ The city intends to continue to encourage rental construction, and hopes at least to maintain the level of rentals in the housing stock over time.

*Some units being added to stock are intended, at least temporarily, for use as secondary units, which probably accounts for the excess of production over need.

Many Households Are "Overpaying" for Housing • Clearlake's average household income is considerably lower than the county's (see Table 22, below) and these low income levels contribute to a housing affordability problem: some Clearlake residents are paying more in total housing occupancy costs (mortgage or rent plus utilities) than 25 percent, and even 35 percent of their incomes. The number of households "overpaying" in relation to their incomes is set forth in Table 23 (p. 73). In all, 65 percent of renters and 30 percent of owners were paying 25 percent or more of their incomes for housing in 1980.

The affordability problem is more severe among renters than among owners. In part, that is because most of the owners (63 percent of those sampled) owned their homes without a mortgage; their occupancy costs would consist only of utilities and land costs (if any).

Among both owners and renters, affordability is presumably most critical to the very low and low income groups. Of renters in those income groups, 35 percent pay more than a quarter of their incomes for housing. Among owners, the equivalent proportion is only 13 percent. The most needy group are very low income renters paying more than 35 percent of their incomes on rent. They accounted for five percent of all Clearlake households in 1980.

Table 22

Clearlake Household
Income Distribution

Income Range (Percent of Median Income)	Based on City Median Household Income, \$8,370			Based on County Median Household Income, \$11,170		
	Income Range	Households No.	%	Income Range	Households No.	%
Very Low (0 to 50% of median)	0- 4,185	730	22	0- 5,586	1,029	31
Low (51 to 80% of median)	4,186- 6,695	598	18	5,587- 8,937	598	18
Moderate (81 to 120% of median)	6,696-10,045	697	21	8,938-13,406	797	24
Above Moderate (120% + of median)	10,045+	1,295	39	13,407+	896	27

Source: Mundie & Associates based on 1980 Census data for 12 enumeration districts having 99% or more of their housing units within city boundaries.

Table 23

Clearlake Households Paying More Than
25 Percent of Their Incomes for Housing, 1980

<u>Tenure Category</u> Rent or Home- Owner Costs as Percent of <u>Income</u>	<u>Renters</u>		<u>Owners</u>	
	<u>25% to 34%</u>	<u>35% and Above</u>	<u>25% to 34%</u>	<u>35% and Above</u>
<u>Very Low Income</u>				
% of all renters/ owners	1.8%	19.8%	2.0%	6.1%
est. no. of households	16	177	48	148
<u>Low Income</u>				
% of all renters/ owners	2.7%	10.3%	1.8%	3.1%
est. no. of homeowners	24	92	44	75
<u>Moderate Income and Above</u>				
% of all renters/ owners	14.6%	15.4%	8.9%	7.7%
est. no. of households	131	138	216	187

Note: Table excludes 318 renter households (35 percent) paying less than 25 percent of their income on rent and 1,705 owner households (70 percent) paying less than 25 percent of their incomes for housing. All figures are estimates based on aggregated sample data from 12 enumeration districts (EDs) and on cross tabulation of incomes vs. housing costs for renters and owners by ED. A uniform distribution of observations was assumed in translating census income and housing categories to those shown above.

Source: Mundie & Associates based on sample data reported by ED, 1980 Census.

Recently-added Units May Not Correspond to
Households' Ability to Pay for Housing

Approximately 731 households are expected to be added to Clearlake's population between 1983 and 1988. If their incomes have the same distribution pattern vis a vis county incomes that was tabulated in the 1980 Census (see Table 22, p. 72), housing affordability requirements can be roughly estimated, which has been done in Table 24.

Table 24

Housing Need/Affordability by
Income Groups of Added Households,
1983 to 1988

<u>Income Range</u>	<u>Households Added (total = 731)</u>		<u>Maximum Affordable Housing Cost</u>	
			<u>Rent (per month)</u>	<u>Own (purchase price)</u>
Very Low	(31%)	227	? to 155	? to \$14,000
Low	(18%)	132	\$155 to 248	\$14,000 to 22,350
Moderate	(24%)	175	\$248 to 372	\$22,350 to 33,500
Above Moderate	(27%)	197	Above \$372	Above \$33,500

Source: Distributions from Table 22 (p. 72). Affordability defined as 1/3 of income = rent and 2-1/2 times income = purchase price, both standard rules of thumb, though many households pay more (and others less) than these proportions.

That Clearlake has a housing cost problem is readily seen by comparing the affordability levels in Table 24 with median rent and median purchase price levels reported in 1980: \$171/month for rents and \$41,400 for purchase. As will be seen later in this chapter (p. 85), the threshold cost of ownership housing in Clearlake is approximately \$23,000 for mobile homes and \$35,600 for stickbuilt homes (both figures exclusive of financing).

It is plain that, for most of those of low and very low income levels, ownership even of a bare bones new unit will not be economically possible. By extension, one can argue that half of the new units added to Clearlake's stock should be rental units, but we have just seen that recent construction produced only 26 percent rental units.

This gap between what the market is providing and what new Clearlake households can afford is, of course, not unique to this city: it is a chronic problem throughout the country. Clearlake's low incomes, relative to the state, at least find a mirror in low existing housing costs (again relative to the state), and it may be that the statistics just presented exaggerate the gravity of the problem to some degree: general income levels have risen since 1980, and there does appear to be a sizable pool of conventional and mobile homes available for rent in Clearlake at well below the rent levels a new market project would charge.

Nevertheless, the affordability problem, which is tenure-related, is a serious one, and suggests corresponding action to continue to encourage rental projects and housing subsidy programs. The City of Clearlake constitutes Lake County's principal low-cost housing area. County average rent (\$181) is six percent higher than the city's; the county average sales price (\$58,600) is over 40 percent higher than the city's. A survey conducted by the County Planning Department in 1981 and reported in the county General Plan found that rental rates in the county generally exceed the affordable rent levels of Clearlake's low income households, as Table 25 shows.

Table 25

Lake County Rental Housing Prices

<u>Type of Unit</u>	<u>Price Range</u>
Trailer	\$110 to \$125
Cottage/Studio Apt.	\$ 90 to \$225
Mobile Home	\$200 to \$300
Single Family (1 bdrm., 1 bath)	\$150 to \$235
Single Family (2 bdrms., 1 bath)	\$210 to \$375
Single Family (3 bdrms., 1 bath)	\$375 to \$550

Source: Sedway/Cooke, County of Lake Comprehensive General Plan, 1981, using Lake County Planning Department survey information, 1981.

A Few Units Are Overcrowded or Have Quality Problems • Overcrowding and problems of physical condition (deterioration or lack of facilities) are other kinds of housing problems in Clearlake. Overcrowding is not a severe problem. The 1980 census reported approximately 144 units in the City of Clearlake with 1.01 or more persons per room, or about four percent of all occupied units, while in Lake County almost five percent of occupied units are overcrowded according to that criterion.

Lack of plumbing facilities is a second problem, but it unusual: less than one percent of the city's housing stock (compared with just over one percent of the county's) lacked plumbing facilities for exclusive use in 1980.

Overall housing conditions appear to be sound. About 35 percent of 1980 occupied units were constructed in the 1970s; the comparable statistic for Lake County is 42 percent. However, some deterioration is evident from even a cursory inspection of the stock. While no systematic conditions data are available, a housing survey by the Lake County Planning Department in 1981 (which did not include the City of Clearlake) found about 11 percent of all units to be in substandard condition, and about one percent to be dilapidated. A rough estimate of 10 percent substandard units in Clearlake would be consistent with county findings and with casual observation.

Groups With Special Housing Needs • Groups which face particularly severe housing problems in many communities include the elderly, female-headed households with children, and minorities. Their housing problems stem largely from their lower-than-average incomes, and may be compounded by discrimination.

In the City of Clearlake, there is not a large minority population. About 93 percent of the population in 1980 was reported as white, non-Hispanic. Hispanics of all races accounted for just over three percent, Blacks for two percent, American Indians for about one percent and others half a percent or less. Virtually all 12 enumeration districts have some minority population; while the occurrence of instances of housing discrimination cannot be ruled out, it is not obvious from the dispersed pattern of residence that systematic neighborhood discrimination against minorities has existed in Clearlake.

Clearlake shares a common problem with many other regions of the country in having a substantial proportion of female-headed households with children: over six percent. This proportion seems more dramatic when seen in terms of children: 32 percent live in female-headed households. Their housing problems typically relate to lower-than-average incomes and the difficulty of finding affordable (rental) housing.

Finally, older individuals and couples on fixed incomes may also have severe housing problems. Given Clearlake's high median age, this group probably represents the most severe housing problem in Clearlake. Renters in this group are at greatest disadvantage, particularly given the shortage of low-rent units and the competition for all rental units resulting from the influx of geothermal workers. Owners, however, may also have housing cost difficulties. While in many cases owners have financial assets not reflected in their income and may be better off than the affordability analysis presented above suggests, in other cases availability of savings or other non-salary assets may be minimal. While many homeowners have mortgages paid off, utility costs can be substantial. The considerable local outcry against increases in utility rates early in 1982 is suggestive of a large number of residents, many of retirement age, who cannot afford any increase in housing occupancy costs.

While the housing needs of the poor are manifest, Clearlake also has another kind of housing problem: the absence of "suburban" development. There are no neighborhoods offering complete urban services (paved roads, street lights, neighborhood parks, etc.) and attractive, planned development of the kind typically sought by administrative, technical and professional workers moving into Lake County as a part of the region's current economic expansion. These households have difficulty finding suitable housing in the City of Clearlake, and more often select residences in one of the planned communities in the unincorporated area even if they are employed in the City. Clearlake is known for its lower income housing, and it therefore continues to attract lower income residents. Achieving a greater degree of diversity in the housing stock is considered by many in the community as a way of increasing housing opportunity and community diversity.

HOUSING OPPORTUNITIES AND CONSTRAINTS

Land Availability

Opportunities for residential development in the City of Clearlake are of three major kinds: presently undeveloped areas, infill of existing low density areas, and redevelopment.

Undeveloped Areas • There are two large undeveloped areas that might be appropriate for future residential and other use. The Borax Lake area, comprising about 1,000 acres within the city limits at the northwest extremity of the city, is in the process of development programming. A preliminary development plan for the area published in March 1982 shows a small number of estate lots and the potential for about 80 higher-density residential units; the principal uses of the site, however, would be agricultural and recreation, uses that respond to the unique characteristics of the site.

The other large area lies upland of Burns Valley in unincorporated land bordering Clearlake on the north. The portion of this property lying west of State Route 53 includes approximately 2,300 acres considered by the owner to be developable. The owner, Clearlake Hotel and Resort Company, has had a tentative land development concept prepared by a consulting firm and has indicated to the City of Clearlake interest in annexation.

Infill • Clearlake has been developed in a very dispersed way, and lots which have remained undeveloped over the years can, theoretically, accommodate a large number of additional units. As an illustration, the recent Facilities Plan prepared on Assessment District 1-6 of the Lake County Sanitation District reviews the development situation in a proposed service area in the City of Clearlake lying generally east of State Route 53. The Facilities Plan reports that there are approximately 6,700 assessor's parcels in the area, representing 9,100 lots, of which only 1,640 (18 percent) are actually developed.

In preparing the Land Use Technical Background Paper, the general plan consultants tabulated existing land use from a land use map completed in 1980. At that time, the number of unbuilt parcels in residential areas was over 7,500 (see p. 57); probably the total number of unbuilt parcels suitable for residential use exceeds 8,000. Thus, the number of housing units in Clearlake, pegged in 1983 at 4,145 units for full-time occupancy (Table 20, p. 70), could conceivably double without any further subdivision activity.

In Table 26 (p. 79) is presented a comparison of existing (1980) land use and the land use pattern shown on the General Plan Map. Of particular importance from the perspective of housing sites are the following features of the General Plan:

- The community is now and is planned to be predominantly residential.
- The vast majority (2,241 of 3,619 acres, or over 60 percent) of designated residential land is in the Medium Density designation, meaning 4,000 to 5,000 square feet per lot.
- The Managed Development/Resource Protection designations offer housing sites where environmental constraints can be mitigated.
- The Residential/Visitor Accommodations designation is intended to allow for a mix of full-time, seasonal and transient housing.
- Multi-unit housing, with densities not in excess of 10 units/acre, may be developed in Low Density and Medium Density districts and in Community Commercial districts with staff approval of site plan; multi-unit housing at densities over 10 but not exceeding 20 units/acre may be developed in those same districts with Planning Commission approval of site plan.
- Single-family manufactured homes may be developed in any residentially-designated area of the city.

No evaluation of the city's residential capacity has been done, but several factors at present do tend to impede infill development. As is pointed out in the Transportation Technical Background Paper, most local streets are not paved. Furthermore, water and sewer are not uniformly available. Some sites present potential hazards that would have to be mitigated prior to development; these areas will be designated as part of a Hazards Overlay District in the Zoning Ordinance.

Finally, casual inspection of Clearlake's residential areas suggests that in many cases the most desirable sites - in terms of ease of development and presence of amenities such as views - have already been developed. Infill opportunities, large in theory, are smaller in practice. The most effective measure to encourage infill would be to complete the sewer service system (the improvements planned for Assessment District 1-6 are a big step in that direction) and to find a way to deal with the access problems presented by Clearlake's legacy of unpaved streets. These service problems reduce actual infill opportunities from roughly 8,000 lots to (a very rough guess) 4,000 lots. But even 4,000 lots constitutes a substantial reservoir of sites. The housing problem, then, is not so much one of land as one of assuring that the sites developed for housing have adequate access and services.

Table 26

Existing Land Use Compared with General Plan Land Use

Land Use Category from General Plan Map	Existing Land Use Tabulation		General Plan Land Use Distribution	
	Acres	Percent of Developed Land	Acres	Percent of Total Land Area
Residential, Total	1,441	65.0	3,619	53.9
Very Low Density	nt		794	-
Low Density	nt		584	-
Medium Density	nt		2,241	-
Visitor				
Accommodations	40	1.8	58	0.9
Visitor Services	nt	-	44	0.7
Other Commercial	83	3.7	108	1.6
Mixed Designations	nt	-	153	2.3
(Residential with Visitor Accommoda- tions; Commercial with Visitor Services)				
Civic/Office ¹	90	4.1	89	1.3
Parks ²	50	2.3	282	4.1
Industrial ³	22	1.0	204	3.0
Agriculture ⁴	490	22.1	47	0.7
Managed Development/ Resource				
Protection	na	-	1,571	23.4
Special Study Areas ⁵	na	-	545	8.1
Total Developed Area	2,216	100.1	nt	-
Total Area	6,720	-	6,720	100.0

nt = not tabulated

na = not applicable

¹The land use tabulation category was public/semi-public.²The land use tabulation category was parks/open space.³The land use tabulation category was light industry/storage.⁴The land use tabulation category was orchard/vineyard.⁵Excludes Bald Mountain area (Clearlake Hotel and Resort Company property) proposed for inclusion in Clearlake sphere-of-influence.

Source: NBW Associates' tabulation from City of Clearlake Existing (September 1980) Land Use Map and from the General Plan Map.

Redevelopment · This approach faces numerous political and administrative obstacles, but may prove to be appropriate in certain older parts of the city, where low-intensity uses could be replaced by higher-intensity uses. Redevelopment, because it requires fairly high intensity uses to be fiscally effective, is likely to include higher density housing if it includes residential units at all. It might fairly be argued that the public benefit of a Clearlake redevelopment project that did not either include housing or create opportunities for housing provision by the market (for example, by improving access) would not justify city efforts.

Nonmarket Constraints

Land Use Controls · Clearlake adopted the Lake County zoning ordinance on incorporation, and has been amending that ordinance to suit its needs since that time. The work program for this general plan effort includes an outline of a revised zoning ordinance, consistent with the plan, to serve as the basis of a new ordinance to be prepared by staff for adoption soon after action on the plan itself.

A heritage of the county's zoning is the Unclassified District, commonly called the U District, within which no use restrictions apply. In recognition of the potential for creating land use conflicts posed by such an open-ended zoning, the Clearlake City Council this year amended the zoning ordinance to require a special use permit for all developments in the U District except single-family residences. Continuation of such permissive zoning without supplemental controls, it was felt, could compromise the ability of the general plan then in preparation to accomplish a more rational and orderly land use arrangement than has prevailed in the community to date.

Zoning in Clearlake is receptive to mobile homes, and to multi-family units. Mobile homes are permitted in the U District, in Single Family Residential (R-1M-H) and in the Mobile Home District (M-H). These districts together account for the vast majority of all residential land in Clearlake. Mobile homes are also permitted, with a use permit, in all commercial districts. Duplexes are allowed in the Duplex Residential District and multi-family units are allowed in two residential districts. In addition, both of these kinds of higher-density are permitted in the U District with a use permit.

Building Codes · When Clearlake was incorporated, the city adopted the Uniform Building Code (UBC) then in use by Lake County, which had adopted it in the mid-1970s. The Clearlake Building Department is responsible for enforcing applicable state and city standards for newly-constructed residential units and improvements. Mobile homes are regulated under title 25 of the state Administrative Code.

Building permits for new construction are issued subsequent to compliance with the Building Code and clearance by the County Health Department and the City Planning Department. Building permit fees to cover project evaluation and inspection are generally less than one percent of project cost, as set by the UBC. The Building Department can enforce compliance with the present building code only on new construction or when improvement costs exceed 50 percent of the value of the pre-existing structure.

The Building Department is also responsible for enforcing standards related to rehabilitating or demolishing substandard housing. Substandard housing has inadequate sanitation, structural or other hazards to the degree that the condition endangers health or safety. Several instances of substandard conditions have been abated since incorporation.¹⁸

Site Improvements · Since Clearlake was incorporated, there have been no major subdivisions processed. It is not known what conditions of approval, if any, would be placed on major subdivisions.

Administrative Processing and Fees · The processing of development proposals in Clearlake does not appear to constitute a major cost compared with other jurisdictions. As shown in Table 27 (p. 82) the cost of securing permits is lower than in Lake County. The processing time required for most permits is also less in Clearlake: six weeks compared with eight weeks in the county.

Connection Fees and User Charges · A wide variety of financing mechanisms are used by water and sewer districts in and around the City of Clearlake. The California Cities Water Company charges homeowners one year's minimum service cost of \$95 for the first year, at the time service is begun, and then deducts subsequent monthly charges from this initial amount; no connection fee is imposed.¹⁹ The Highlands Mutual Water Company imposes a connection fee of \$500 per household.²⁰ For parcels located within the Southeast Regional Wastewater System which already have collector and lateral sewer lines in place, a capital expansion fee of \$250 is charged.²¹ School districts in Lake County also exact a per unit fee to partially cover the cost of providing temporary classroom facilities. The fee is based on projected numbers of school age children per unit.²² Division of small parcels would also be subject to a school impact fee under regulations being considered in the summer of 1983.

Limited Funds for Subsidized Housing · While there are several subsidized housing projects and programs in effect in Clearlake, federal funds are currently limited. These limitations have led to an increase, beginning in 1982, in the proportion of adjusted gross income elderly persons must pay; formerly 25 percent, it is now 30 percent.

Clearlake has approximately 135 subsidized housing units at the present time. These include two Section 8 lower-income rental assistance projects, Highlands Village (40 units) and Clearlake Apartments (72 units), both on Old Highway 53. The combined waiting lists for these projects include more than 100 households. Also in effect is a Section 8 rental assistance program utilizing existing housing. Funds are presently available to subsidize the rent on 44 market-rate units in Lake County; at present 23 of the households benefitting from this program live in Clearlake. Half of the Clearlakers receiving rent subsidies under this program are elderly persons; the other half are low-income families or disabled persons. There are presently 29 persons on the waiting list for this program.²³

Table 27

Comparison of Development Processing Times and Fees, ca. 1982

<u>Permit</u>	<u>Clearlake</u>	<u>Lakeport</u>	<u>Lake County</u>	<u>Yolo County</u>
Reversion to Acreage	6 wks. \$115	8 wks. \$50	8 wks. \$180- \$225	- \$75- \$350
Use Permit	6 wks. \$75	3 wks. \$75	8 wks. \$75	8 wks. \$75
Variance	6 wks. \$50	3 wks. \$75	8 wks. \$50	- \$75
Rezoning	n/a \$100	1-2 mos. \$125	8-12 wks. \$100	8 wks. \$250
General Plan Amendment	n/a \$100	1-4 mos. \$125	6 mos. \$100	16 wks. \$400
Major Subdivision	n/a \$235	6-12 wks. \$365+	8 wks. \$50 + \$1/lot	- \$200 + \$5/lot
Minor Subdivision	6 wks. \$235	4-8 wks. \$50	8 wks. \$235	8 wks. \$75 + \$5/lot
Initial Study/ Negative Declaration	6 wks. \$100/min. hearing time n/a	4-6 wks. \$100	4 wks. \$100/min.	3-4 wks. /c/ \$50
Environmental Impact Report	Depends on project - \$100/min. hearing time	3-6 mos. Fee depends on project	Depends on project - \$100/min.	2-4 wks. /c/ \$400 +

/c/ = concurrent with other actions.

Sources: Clearlake data from Bill Pfanner and Celeste Wixom, City of Clearlake Planning Department; Lakeport data from Pam Tuft, Lakeport City Planner; Lake and Yolo County data from Table IV-20, Lake County General Plan, Sedway/Cooke, 1981, derived from Survey of Processing Fees, Yolo County Community Development Agency, January 1981.

The Section 8 housing assistance program units are administered locally by the Rural Communities Housing Development Corporation (RCHDC), which acts as a housing authority for Mendocino and Lake Counties. This agency's Ukiah office has administered a housing rehabilitation program in Lake County for three years, financed with Community Development Block Grant (CDBG) funds.

It is the opinion of RCHDC staff that due to the federal requirement that subsidized housing be located in areas where off-site improvements are in place, Clearlake is at a disadvantage when compared to some other potential subsidized housing locations in the county.²⁴ When this factor is added to a second federal criterion, that subsidized units not be located in a mapped flood plain, it has on specific past occasions effectively eliminated Clearlake from contention for projects slated for Lake County.

Clearlake can apply to HUD for funds under the CDBG program, and RCHDC would help with the grant application and with program implementation. Funds under the rehab program can be used to construct curbs, gutters and sidewalks in residential areas if part of a local housing conservation program.²⁵

The RCHDC also has a self-help housing program under way in Mendocino County. This effort provides technical assistance to families to rehabilitate their homes with loans provided by the Farmers Home Administration.²⁶

Market Constraints

The market exerts constraints on the ability of housing providers to meet housing goals. Private market forces regulate availability and cost of land and improvements, materials, labor and capital.

Land and Improvement Costs - The cost of land and improvements in Clearlake varies according to size of parcel, location and availability of services. Lake County Multiple Listing Service 1981 listings show residential lots selling in the Clearlake Park area of the city from \$4,500 (a 50x100-foot lot on a gravel road with no water or sewer service) up to \$57,000 for lake frontage with amenities in place. In the Clearlake Highlands area, the equivalent range was \$2,750 for the least expensive lot (50x100 with no road access or services) up to \$42,000 for a five-acre site with views and with services in place. The average cost of the least expensive yet still generally available lots would range from \$6,500 to \$10,500 depending on availability of sewers.

Land and site improvement costs comprise about 20 percent of housing costs. While Clearlake has a large supply of unbuilt residential lots, public infrastructure is often inadequate. Presence or absence of service accounts for a large measure of the variation in lot prices.

Construction Costs • Costs of construction vary with the type and style of dwelling. Single-unit contracting is not the most economic approach to building housing, but is usually the approach used in Clearlake because the lack of large scale demand has not created opportunities for large scale development. The average cost of construction of the least expensive stickbuilt homes in Clearlake would range from \$28 to \$34 per square foot. To some degree these costs are averted by local residents via purchase of mobile homes. A comparison of threshold housing costs of conventional and manufactured units in Clearlake is presented in Table 28 (p. 85).

Financing Costs • The cost of money is the most severe constraint on housing availability and affordability at the present time. Over the life of the average home, interest payments can amount to half of the total money costs, affecting both the financing of new construction and, to a lesser degree, of rehabilitation.

In Clearlake, the primary lending institutions are generally requiring a down payment of 20 percent of the cost. Fidelity Savings in Clearlake is issuing first mortgages at 12-3/4 percent at the present time (June 1983). Humboldt Savings currently has a 14-1/2 percent first mortgage rate. Bank of America's rate for home loans is 13-1/4 percent. World Savings has just opened a branch in Clearlake. Each of these lenders also charges loan service fees of 2-3 points. Increasingly, individual parties are acting as primary lenders in order to provide purchaser financing.²⁷

New construction loans, however, cannot be seller financed and new mobile homes are financed at market interest rates (with a shorter payback period than the standard 30-year amortization schedule). Conventional loans for rehabilitation or improvement are usually financed at higher rates than mortgages.

Opportunities for Energy Conservation

A wide variety of options for energy conservation may be undertaken by housing occupants, developers and the government. While federal programs related to energy use have been reduced or eliminated by the current administration, the State of California is still encouraging energy conservation and exploitation of alternative energy sources. In 1983, Title 24 State Administrative Code building standards will take effect, increasing the energy conservation requirements for new construction. Clearlake is in Zone 2; there are different requirements for different geographical zones delineated on the basis of climate. The federal and state governments offer tax credits for solar and energy conservation home improvements.²⁸

Table 28

Minimum Cost of Owner-Occupied Threshold Housing¹ in Clearlake, 1983

	<u>Stickbuilt</u> ²	<u>Manufactured</u> ³
Land Cost ⁴	\$6,500-10,500	\$6,500-10,500
Construction/ Purchase Cost ⁵	\$28,000	\$15,500
Permits & Fees		
City Development Fees ⁶	\$750-800	\$ 640
Sewer Connection Fees ⁷	250	250
Water Connection Fees ⁸	95-500	95-500
Schools (per housing unit fee) ⁹	N.A.	N.A.
Total at Purchase	\$35,600-40,050	\$23,000-27,400

¹These estimated costs were compiled on the basis on interviews with local officials, builders and real estate professionals. The term "minimum cost" does not imply that these are the absolute minimum costs, but rather that these are the lowest costs which presently occur on a generally available or regular basis. At points where the cost is dependent on the presence or absence of public improvements, it has been assumed these improvements would be in place.

²Based on two bedroom house of approximately 1,000 square feet, and including a one-car garage.

³Based on a mobile home measuring 14 feet by 56 feet (784 square feet) with least expensive permitted foundation (compacted pad).

⁴Assumes 50 by 100 foot lot, serviced by dirt road, without a septic tank in place and with water and power lines in place at the roadway.

⁵Construction costs for stick-built house assumed to be \$28-34 per square foot. Total given is for unit of 1,000 square feet. Purchase price of mobile homes includes base price, applicable taxes and foundation (compacted pad).

⁶Includes fees for the following permits and activities: for stickbuilt units reversion to acreage fee, variance fee (due to the large number of irregular lots in Clearlake), sewer connection, building permit, plan check fee and filing fee. Mobile home fees include variance fee, reversion to acreage fee, lot preparation fee, mobile home installation permit and encroachment fee.

⁷Based on Southeast Regional Wastewater System capital expansion fee of \$250 per connection.

⁸California Cities Water Company does not charge for connection to that system, but does require up-front payment of \$95 for the first year's service charges; after the first year, consumers are billed on a monthly basis. The \$500 charge represents the current connection fee imposed by the Highlands Water Company.

⁹No comprehensive schools fee schedule exists. Recently these fees have been negotiated between the Lake County Office of Education and individual developers. The estimate presented here stems from a survey of some of the more recent agreements. Fees apply only to new subdivisions (of which there have not been any in Clearlake to date) but plans were under way in the summer of 1983 to impose school fees for minor land divisions.

Two important programs are currently offered by Pacific Gas and Electric Company (PGandE) in the Clearlake area. The first is a program providing interest free loans of up to \$1,000 for energy conservation improvements including insulation, hot water heater jackets, duct wrapping, weather stripping, caulking and low-flow shower heads. Improvements packages including these features can save as much as 40 percent of utility bills, according to PGandE estimates. Homeowners have 50 months to repay loans; landlords, renters and low income households have up to 100 months to repay. Currently, there are four contractors in Lake County approved by PGandE for participation in the program.

The second PGandE program is the energy audit offered by the utility's Residential Conservation Service. A PGandE residential user can request that the Service conduct a residential energy audit. Utility staff will advise occupants as to the specific improvements that could result in energy savings, and the estimated payoff periods of energy-conservation investments. These audits are recommended in advance of participation in the zero-interest loan program.

Clearlake has adopted Lake County's Ordinance No. 1235 which concerns wind energy conservation systems. The ordinance regulates the placement of wind turbines (windmills), requiring a use permit in some circumstances. These units are gaining increasing popularity in areas with appropriate wind conditions.

The inclusion of solar hot water and space heating in new homes is a well-documented method of energy conservation which would be appropriate in Clearlake. An analysis by Solar Unlimited, Inc., reveals that adding the cost of a solar heating system to the cost of a home will more than pay for itself over the long term. With payments of \$62/month over eight years, utility savings are estimated to be about \$42/month; to those savings must be added the financial advantages of the solar tax credit, the continued reduction in utility bills after the system is paid for, and the enhanced value of the dwelling having a solar system in place.²⁹

Installation of solar hot water systems by a contractor costs \$2,000 to \$3,000 and is eligible for a tax credit of about \$1,000. The homeowner is estimated to save about 95 percent of the water heating bill, resulting in a three- to five-year payback with little maintenance required.³⁰ There are a number of local solar and alternative energy suppliers and installers in Lake County, including two in Clearlake.

Passive solar systems involve specialized construction materials and design features to minimize the effect of daily temperature fluctuation. The greatest opportunity for effective use of passive solar systems lies in new construction. Currently, Clearlake has no special subdivision or building requirements to encourage either active or passive energy conservation.

TRANSPORTATION

PURPOSE

The current policy at the state and regional levels emphasizes developing a balanced, multi-modal transportation system. The state's General Plan Guidelines note that the policies and action programs of the circulation or transportation element should:

- Coordinate the transportation and circulation system with planned land uses;
- Promote the efficient transport of goods and the safe and effective movement of all segments of the population;
- Make efficient use of existing transportation facilities; and
- Protect environmental quality and promote the wise and equitable use of economic and natural resources.

The Lake County General Plan and the 1982 Update of the Lake County Regional Transportation Plan present policies and programs which apply specifically to Clearlake: improvements to State Route 53 and attendant frontage roads; priorities for transit service; development of an Airport Master Plan; alleviation of traffic congestion on Lakeshore Drive; and standard street improvements to Clearlake's streets.³¹ Recently completed traffic studies provide the first detailed look at Clearlake's street and road system.

It is expected that financing for road improvements in rural areas will continue to be limited over the next ten years. However, even modest improvements will require funding from county, state and federal sources. While the General Plan outlines a transportation system suited to fiscal reality, Clearlake should aggressively pursue funding for qualified projects, particularly those of regional significance.

STREETS AND ROADS

Street Classification

Figure 7 (presented at the end of the Technical Background Papers) shows the existing functional street classification of Clearlake's streets and roads. Functional classification identifies streets according to their transportation function and can be useful in assuring consistent and proper street improvements. Street classification also helps in determining appropriate land uses and frequency of access to adjacent property.

State Route 53 is a major arterial, intended to serve longer regional and local trips with the most efficiency. Lakeshore Drive, Olympic Drive, Old Highway 53, and Sulphur Bank Drive/Rose Avenue are shown as arterial streets, intended for moving residents and visitors through and across

town. Collector streets serve shorter residential trips and connect arterials with local streets. Local streets are not shown on the map and are used primarily for access to residential property.

State Route 53

State Route 53 provides for major north-south movement and is used by residents, visitors to the area, and through traffic. As Clearlake's only major arterial, it is key to the local transportation system. Clearlake residents would like to see improvements to the highway continue to balance local and regional transportation needs. As a major arterial, access to State Route 53 should be limited to arterial and collector streets.

The State Department of Transportation (CalTrans) estimates traffic volumes on State Route 53 at Lakeshore Drive/40th Avenue to be approximately 8,000 vehicles/day (ADT), increasing to 11,500 ADT in the summer months.³²

The above intersection has recently been improved with the installation of a traffic signal and turning lanes. CalTrans also plans to provide a frontage road and modify intersections on State Route 53 between Cache Creek and a point 1.1 miles north during the 1983/84 Fiscal Year.³³ The Regional Transportation Plan encourages the state to provide additional operational improvements on Route 53 in lieu of a four lane highway.³⁴

In general, signs along Routes 53, 20, 29 and 128 and the Silverado Trail do not yet reflect the incorporation of Clearlake. "Clearlake" (or possibly "Clearlake City") should be identified as a destination on these routes.

Evaluation of the Local Road Network

The generally poor condition of Clearlake's streets was a key issue in the 1980 incorporation. While arterial and collector streets are, for the most part, paved, the majority of local streets remain unpaved. Traffic and street signing is erratic and street standards have not been consistently implemented.

Access to the lakeshore, to commercial areas, and other longer trips through the city is generally via the three arterials linked with State Route 53: Lakeshore Drive, Olympic Drive, and Old Highway 53. The fourth arterial, Sulphur Bank Drive, provides alternate access to State Highway 20 (near Clearlake Oaks), to Borax Lake, and to lakeshore property outside Clearlake city limits.

Collector streets and roads are the only paved roads in a number of Clearlake's residential areas, particularly outside of the downtown area. Striping and other standard street improvements are generally lacking on collector streets.

Figure 8 shows existing and estimated future traffic volumes on selected arterial and collector streets.³⁵

Intersections currently posing significant safety problems have been identified in the Traffic Accident Reduction Study.³⁶ Other current and future problem areas, where the amount and nature of traffic exceeds or is expected to exceed the road capacity, include:

- Lakeshore Drive, State Route 53 to Olympic Drive;
- Intersections of arterial and collector streets with State Route 53, in particular, at Olympic Drive, Old Highway 53, and Davis Avenue; and
- Unpaved collector streets, including Oak Street, Country Club Drive and Boyles Avenue.

Other problems arise from the lack of consistent traffic and street signs, striping and other standard road improvements.

Programs

Because of the limited funds available for road improvements, non-capital intensive mitigation measures are emphasized for Clearlake's transportation system.

Priority A improvements identified in the Traffic Accident Reduction Study and the Regional Transportation Plan Annual Element for Clearlake³⁷ provide a starting place for a local road improvement program. Ideally, a long-range transportation improvement program (TIP) would identify priorities and funding sources in a comprehensive manner. A TIP for Clearlake should include safety improvements, signing, improvements to arterial and collector streets, striping and crosswalks, road maintenance, and other necessary improvements.

Street standards for all new and improved streets should be implemented. Such standards would help ensure a safer and more multi-modal circulation system. New development should be required to develop road frontage according to these standards.

The proposed Lakeshore Drive Design Study will address some of the causes of traffic congestion on Lakeshore Drive, in particular the need for off-street parking, the need for sidewalks, curbs, gutters, limited driveway access, and turning lanes. Uhl Avenue is designated to be improved as a collector to provide Clearlake residents with an alternative to Lakeshore Drive. A specific design study of Uhl Avenue will determine the most appropriate realignment for connections with Lakeshore Drive or Old Highway 53 and Olympic Drive. Funds for Uhl Avenue improvements should be sought from Lake County, state and federal sources.

Visitor traffic can be directed onto arterials through improved signing on State Route 53 and in town. A "Visitor Loop" along Lakeshore and Olympic Drives can serve as an attractor for visitor services in the downtown area.

To avoid impacting residential neighborhoods, access to the new Anderson Marsh State Park should be from State Route 53, south of the Clearlake city boundary at Cache Creek, or from a new collector street off Old Highway 53 (see Figure 7).

The city should maintain all arterials and collectors as paved streets, and should assist in organizing local street improvement districts to improve and pave local streets. Consideration should be given to the possibility of including improvements to local streets in an application for Community Development Block Grant funds where demonstrable emergency access problems exist.

PEDESTRIAN ACCESS

Pedestrians often experience difficulty moving around Clearlake, particularly in commercial areas and along Lakeshore Drive. A lack of sidewalks or walkways in Clearlake generally forces pedestrians to use the roadway for walking. Crosswalks are not indicated at many intersections. These factors combine to create an unsafe situation for pedestrians, especially the elderly. The need for walkways and crosswalks was identified as a major transportation concern of Clearlake residents.

Programs

The street standards to be adopted by the City Council should indicate where sidewalks or walkways will be required on new and improved streets. In conjunction with a street striping program, crosswalks should be indicated at appropriate intersections and at other locations in commercial and visitor-serving areas.

The Regional Transportation Plan states that 2 percent of the Transportation Development Act funds will be reserved for pedestrian and bicycle projects. The city should apply these funds toward key pedestrian facilities in the downtown area.

BICYCLE USE

Bicycles do not currently appear to be a major transportation mode in Clearlake. The terrain is hilly and the poor condition of many of the roads makes local bicycle travel difficult and unsafe.

The Lake County Bike Plan shows bicycle routes along all arterials except Sulphur Bank Drive and along a number of collectors in central Clearlake.³⁸ (See Figure 7.) State Route 53 is shown on the Statewide Bicycle System.

As Clearlake grows and road conditions improve, bicycle use will increase, bringing with it an increased need and demand for bike facilities.

Programs

Street standards to be adopted by the City Council should allow sufficient width for safe bicycle use. Bicycle lanes are preferred, but possibly difficult to implement in Clearlake at this time. Right edge striping, which allows paved width for bicyclists, will increase bicycle safety on arterial and collector streets.

Bicycle parking should be provided in commercial and other public areas. Also, bicycle safety programs should be encouraged through existing enforcement agencies such as the Police Department and the California Highway Patrol, both for bicyclists and for automobile drivers.

The city should cooperate with other jurisdictions to implement the Lake County Bike Plan through directing any available state and federal funds into projects identified in the Regional Transportation Plan.³⁹

PARKING

Parking in the downtown area has been identified as a serious problem by Clearlake residents and in recent traffic studies. On-street perpendicular parking contributes to traffic congestion along Lakeshore Drive. There is a lack of developed off-street parking in the downtown-Lakeshore Drive area.

The city currently requires parking facilities at new commercial sites. Off-street parking is generally not a problem in other areas of Clearlake.

Programs

As the downtown area expands its offerings of visitor-serving facilities, the need for off-street parking will increase. The development of adequate off-street parking facilities should be addressed as part of the proposed Lakeshore Drive Design Study.

The Design Study should also address the need for a Downtown Parking District to coordinate solutions to the off-street parking problem. The District could be managed by a Parking Commission appointed by the City Council. Funding for off-street parking facilities should be sought from assessments and public sources.

PUBLIC TRANSPORTATION

Clearlake is fortunate to have a public transportation system which appears to meet its transit needs in a cost-effective manner. While there are limitations to the existing transit and paratransit services, particularly regarding hours of service and out-of-town travel, service is generally more than adequate, considering the rural character of the area.

Demographic characteristics of Clearlake residents indicate a high proportion of persons who are generally thought of as being "transit dependent": the elderly and those with low incomes. Over one fourth of

the population is 65 years of age and older. The median income of Clearlake households in 1980 was approximately \$8,400 - less than half of the median state income of \$18,000. Approximately 18% of Clearlake residents had incomes below the poverty level and unemployment is also higher than the state average.⁴⁰

Public transportation is currently provided in Clearlake by a number of transit and paratransit services:⁴¹

- Clearlake Dial-A-Ride. Clearlake DAR is a demand-responsive shared ride taxi service available weekdays 7 am to 6 pm. Riders are charged .50 per trip and the balance of the program is funded through public funds. The DAR provided 57,000 trips in its first year, 1981-82, with a very high fare recovery ration of 26.5 percent (fare revenue/operating cost). Handicapped persons accounted for approximately 6 percent of the total annual ridership.⁴²
- North Coast Opportunities. NCO provides accessible transportation services to senior citizens in Lake County. Two publically funded programs, the Senior Transportation System and the Volunteer Driver Program, served a total of 15,000 trips in the 1981-82 year. Approximately 11 percent of the trips were made by handicapped persons.⁴³
- Lake County Transit. Lake County Transit provides bus service around Clear Lake and between Clear Lake communities and Ukiah. LCT operates Monday through Saturday and fares are based on the distance traveled. LCT recently increased the frequency of service around Clear Lake. LCT is set up to handle "packages or people".⁴⁴
- Greyhound Bus Lines. Greyhound provides daily interregional bus service from Clearlake to Lakeport, Middletown and the San Francisco Bay Area via Santa Rosa and U.S. 101. A bus travels southbound in the early morning and northbound in the evening. Greyhound service to Clearlake would not be affected by the recent service cuts proposed to the California Public Utilities Commission.

Some duplication of service has been indicated in reports evaluating the above services, particularly between Clearlake Dial-A-Ride and NCO Senior Transportation.

Programs

Both CalTrans and the Regional Transportation Plan recommend that the successful DAR program be continued and expanded to include accessible vehicles and service to Lower Lake. The DAR and other transit and paratransit programs should continue to be monitored to ensure cost-effective service without unnecessary duplication.

The Land Use Map shows concentrated commercial and visitor-serving land uses along arterial streets to enhance the potential for transit. If and when a combination fixed-route, demand-responsive system becomes viable in Clearlake, buses should be directed onto arterial and collector streets.

AIRPORT

Pearce Airfield, located in the City of Clearlake, is owned and managed by Lake County. The single 2,100 foot runway accommodated approximately 16,500 operations in 1980.⁴⁵ The airfield is governed by visual flight rules (VFR) and offers no radar or instrument approaches.

Concerns about the future of Pearce Airfield have been expressed by Clearlake residents and other public officials. The Lake County Airports Master Plan (Draft) discusses the airfield but does not make recommendations on alternate sites. Problems associated with use of the airfield include noise, incompatibility with neighboring residential uses, and safety issues arising from the short length of the runway. The Board of Supervisors has recently appointed a committee to look at alternatives for Pearce Airfield and/or a single county airport.

Programs

The airfield issue is an old one for Clearlake. Discussions began during the Master Plan process must be continued to allow the county and cities to work toward a mutually-beneficial solution, particularly regarding the selection of an alternate site for an airfield in south Lake County.

The General Plan recommends establishing an Airfield Advisory Committee to study long-range solutions and to propose alternate sites to Pearce Airfield. To address the existing problem of conflicting uses adjacent to the airfield, the Land Use Map shows industrial uses surrounding and northwest of Pearce Field.

OTHER MODES - WATERWAYS

Clear Lake is used extensively for recreational boating. The feasibility of establishing a waterborne public transportation system across Clear Lake was evaluated as part of the County Transit Study. Findings indicated that road transportation is more efficient and has the flexibility to serve more people than a waterborne system.

Boating safety on the lake is enforced by the Lake County Sheriff's Department. Clear Lake is not connected with other navigable waterways.⁴⁶

TRANSMISSION LINES

The existing PG&E transmission corridor is shown on Figure 7. No additional corridors are planned within Clearlake.⁴⁷

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Footnotes	95
Persons Contacted	104

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- ⁷Ibid.
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- ¹¹Sedway/Cooke, op. cit., Natural Resources and Natural Areas Working Paper.
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- ¹⁷Tim Strand, Engineering Technician, and G. M. Pettersen, City-County Projects Engineers, CalTrans, telecom., October 21, 1982.
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- ²⁰Sedway/Cooke, op. cit.
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²²Bill Pfanner, Assistant Planner, Clearlake Planning Department, telecom., September 15, 1982.

²³Sedway/Cooke, op. cit.

²⁴Bill Pfanner, op. cit.

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³⁰Materials presented in this section are drawn from Sedway/Cooke, Lake County General Plan and Technical Appendices, Hazards Working Paper, 1981.

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³³Earl Hart, personal communication to Sedway/Cooke, August 12, 1980.

³⁴Slosson and Associates, op. cit., p. II-10.

³⁵State of California, Assembly Interim Committee on Municipal and County Government, 1965.

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³⁸Frances Bawden, California Dept. of Forestry, telecom., October 13, 1982.

³⁹Captain William Beckwith, California Dept. of Forestry, telecom., October 13, 1982.

⁴⁰Parker (cited at note 36).

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⁵Borax Lake estimate from Preliminary Master Plan for Dumont Vineyards and Estates, March 5, 1982; Burns Valley estimate for Clearlake Hotel and Resort Company and from a preliminary development scheme presented to the general plan consultant April 20, 1982.

⁶The estimate of 8,614 residents is a valiant "best guess". The 13 EDs which serve as the basis of demographic and housing estimates appearing in this background report had a total population of 7,235 in the 1980 census. Other EDs partially within the city (105, 111 and 113) had a collective population of 1,639. Local staff in the city and county believe the population of Lake County was significantly undercounted, and there is reason to believe that mobile homes (and their residents) may have been systematically undercounted throughout the state in the 1980 census. The Department of Finance estimated city population as 13,275 as of incorporation in November 1980, but their estimate is based on a formula which probably exaggerates the population of Clearlake.

More recent estimates by DOF put Clearlake's 1982 and 1983 populations at 9,200 and 9,400 respectively, with the county's at 24,610 in 1982 and 25,265 in 1983. If the 1980 figure of 8,614 and the more recent estimates for Clearlake are accurate, the city has been growing at an annual rate of about three and one-half percent.

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¹¹U.S. Census, 1980.

¹²Ibid.

¹³D'Appolonia Consulting Engineers, op cit.

¹⁴Jud Newman, Labor Market Analyst, State Employment Development Department, telephone communication, September 2, 1982.

¹⁵D'Appolonia Consulting Engineers, op. cit.

¹⁶Woody Merrill, Schools Attorney, Lake County Office of Education, telephone communication, September 8, 1982.

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- ¹⁹Fleming Jensen, Manager, California Cities Water Company, personal communication, May 2, 1983.
- ²⁰Mrs. Vandemaele, Highlands Water Company, personal communication, January 6, 1983.
- ²¹Gary Brown, Utilities Manager, Lake County Special Districts, January 5, 1983.
- ²²Merrill, op. cit., telephone communication, May 6, 1983.
- ²³Ruth Gould, Office Manager, Highlands Village; Charlene Murphy, Manager, Clearlake Apartments; and Sally La Salle, Property Manager, Rural Communities Housing Development Corporation, telephone communications, October 1982.
- ²⁴Sally La Salle, op. cit., personal communication, May 16, 1983.
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- ³³Delbert Brown, Deputy District Director, CalTrans District 01, correspondence, July 30, 1983.
- ³⁴Lake County/City Area Planning Council, op. cit.
- ³⁵TJKM Transportation Consultants, Traffic Accident Reduction Study, 1982. Future trip demand is estimated based on future land uses and projected population increases.

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38Lake County/City Area Planning Council, Lake County Bike Plan, 1980.

39Lake County/City Area Planning Council, RTP 1982 Update.

40Mundie & Associates estimate, Clearlake Housing Element.

41The following documents detail the transit and paratransit services in Lake County:

County/City Area Planning Council, Social Service Transportation in Lake County, 1980.

CalTrans/Lake County/City Area Planning Council, Lake County Transit Study, 1981.

CalTrans/Lake County/City Area Planning Council, Action Plan for Coordination of Social Service Transportation Development Act in Lake County, 1981.

CalTrans/Lake County/City Area Planning Council, Evaluation Report for the Transit Services Funded Through the Transportation Development Act in Lake County, 1982.

42CalTrans, op cit.

43CalTrans, op cit.

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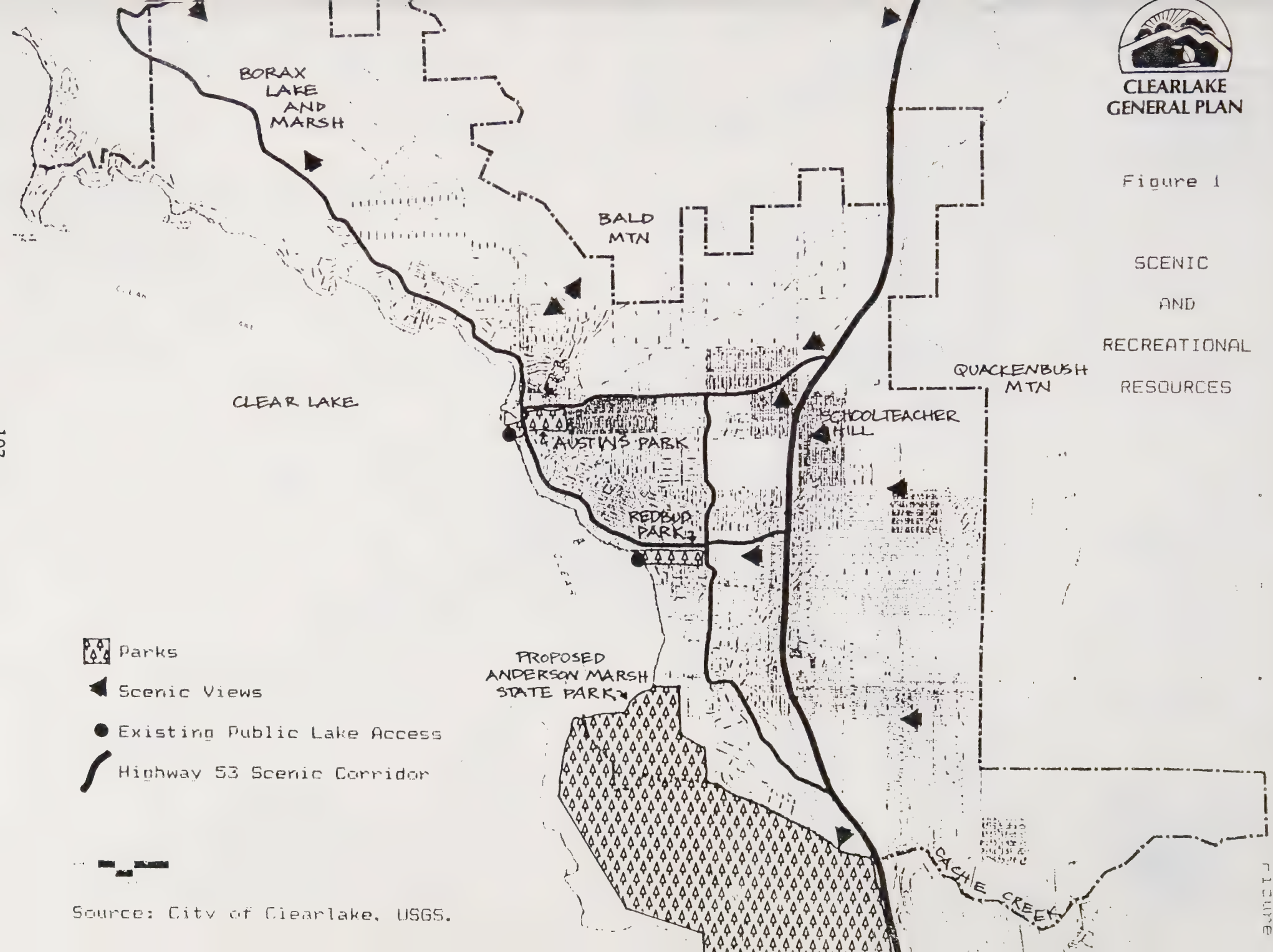
Celeste Wixom
Clearlake Planning Dept.

Norma Wright
Lake County Historical Society

Eric Yamada
Resort Aviation
Pearce Field Airport

Figure 1

SCENIC
AND
RECREATIONAL
RESOURCES





CLEARLAKE
GENERAL PLAN

Figure 2

FLOODWAYS
AND
FLOODPLAINS

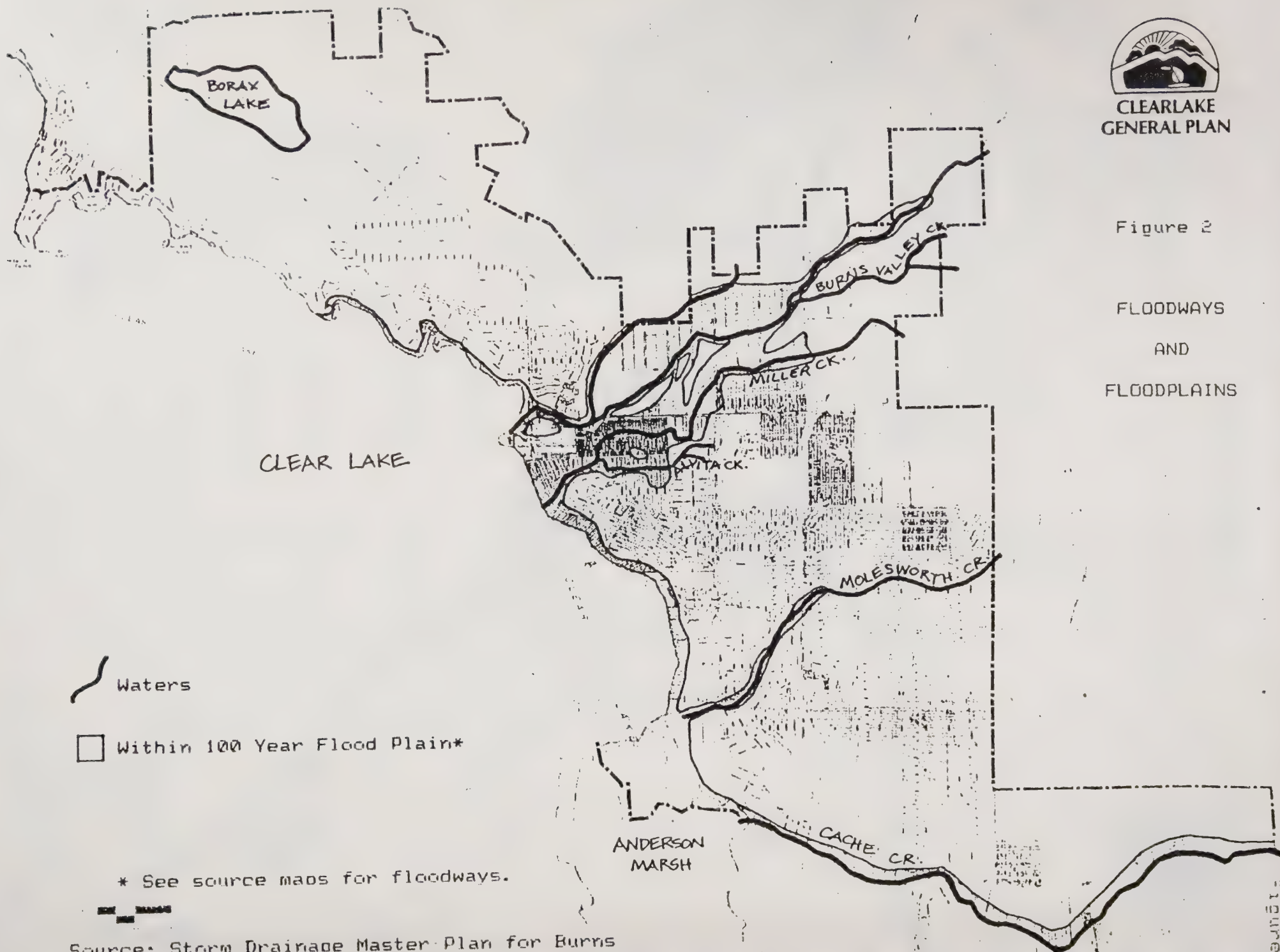
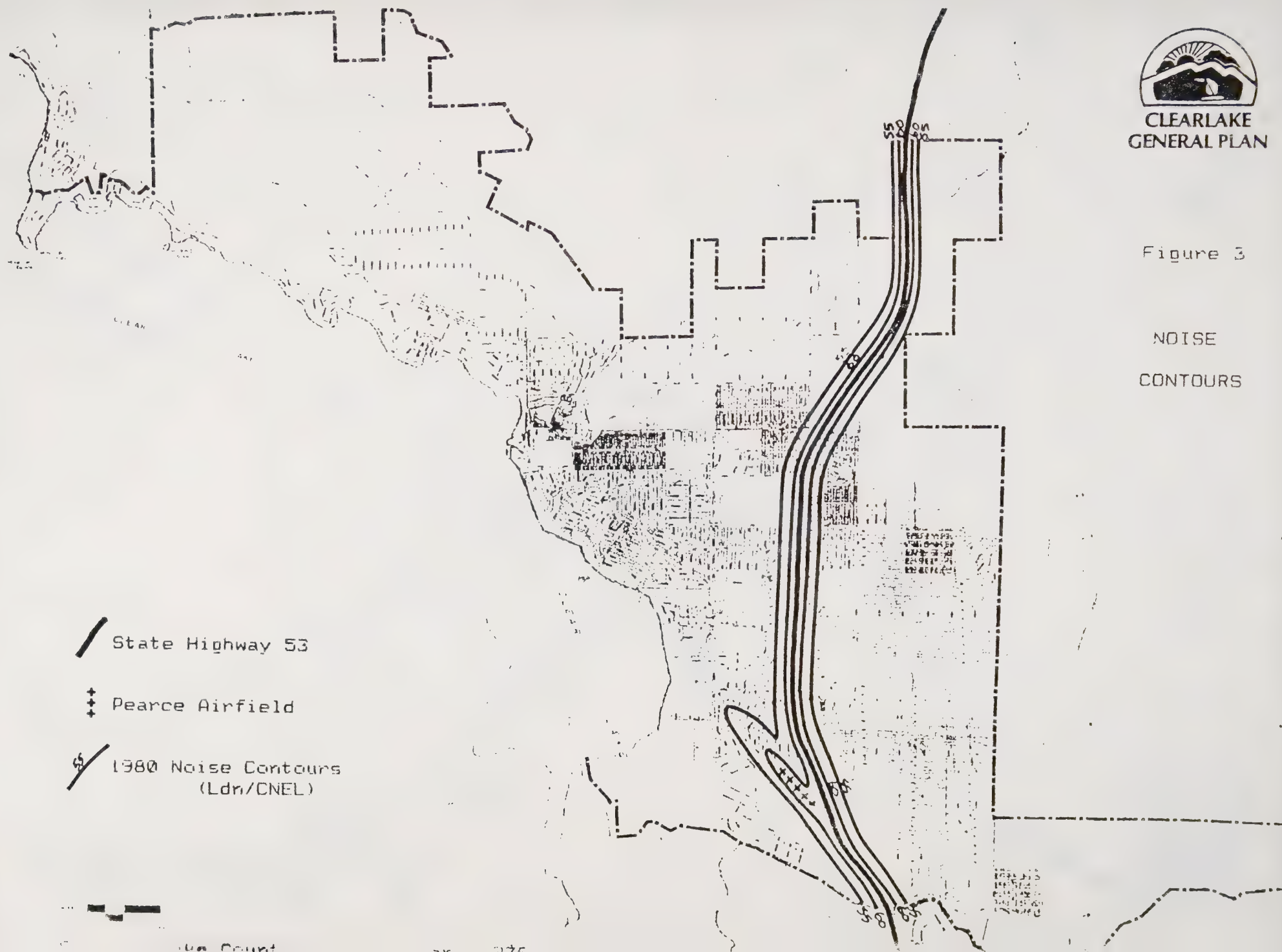


Figure 3

NOISE
CONTOURS



State Highway 53




Pearce Airfield

1980 Noise Contours
(Ldn/CNEL)




Figure 4

SLOPE
AND
LANDSLIDE
HAZARDS

Slope

-  0 - 14%
-  15 - 30%
-  Greater than 30%

Landslide Hazard

-  Variably Stable
-  Unstable
-  Existing Landslide Debris

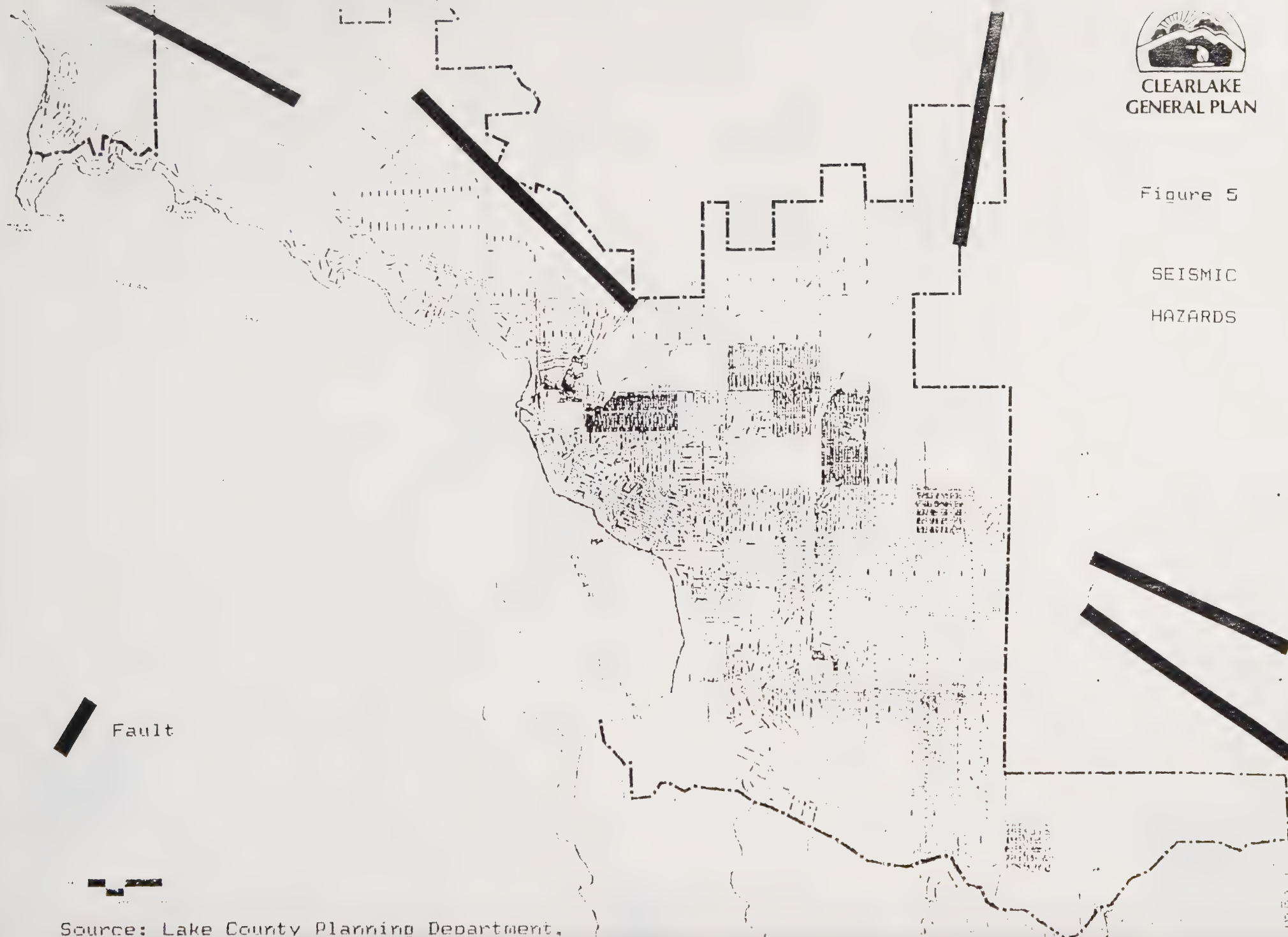


CLEARLAKE
GENERAL PLAN

Figure 5

SEISMIC

HAZARDS





CLEARLAKE
GENERAL PLAN

Figure 6

LIQUEFACTION
POTENTIAL

- ☐ Liquefaction and Seismic Soil Consolidation Study Zone
- ☐ Seismic Soil Consolidation Zone Outside of Liquefaction Study Zone








Source: Lake County Planning Department,

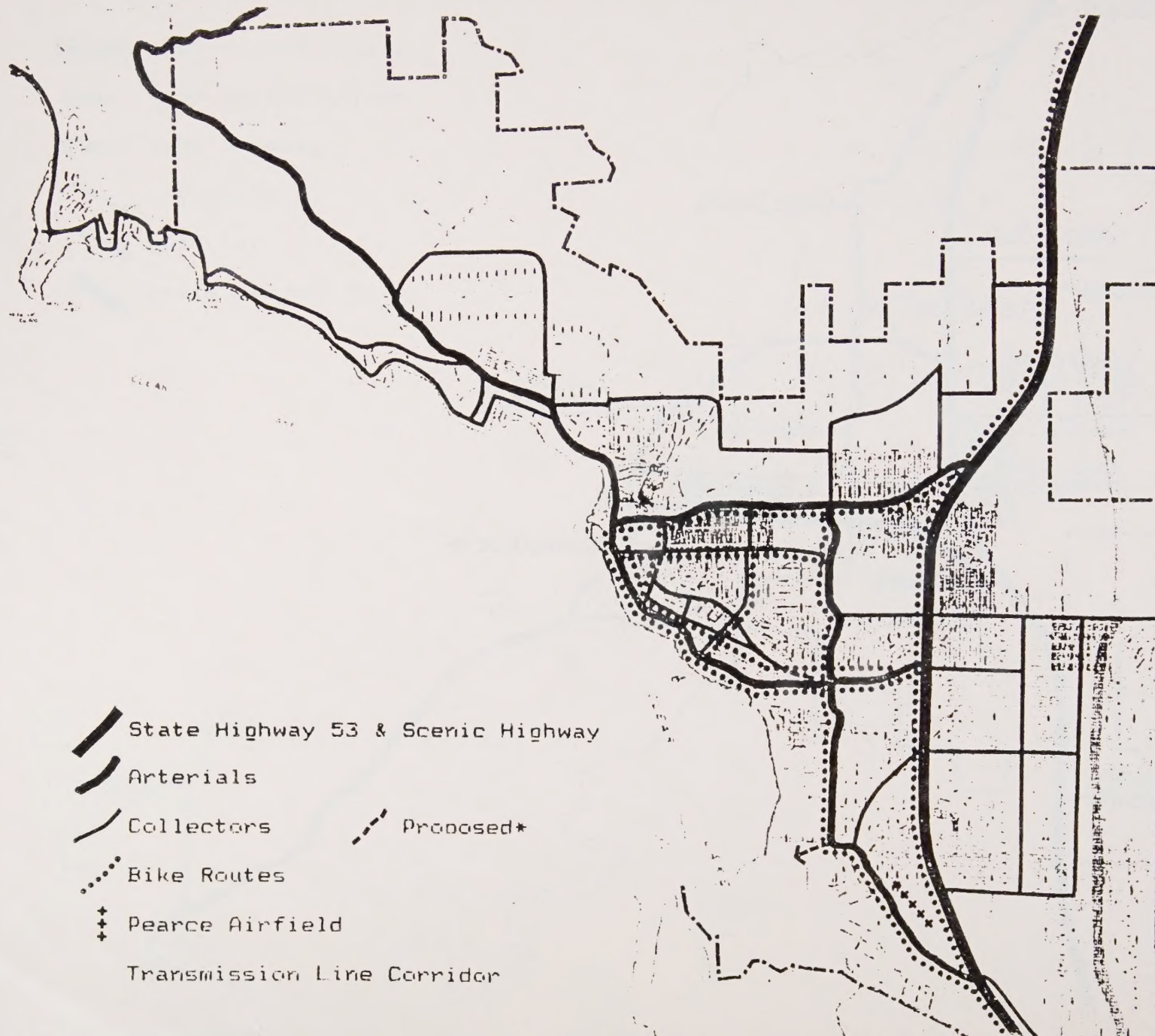
1982

Figure 6

Figure 7

TRANSPORTATION
NETWORK

-  State Highway 53 & Scenic Highway
-  Arterials
-  Collectors
-  Proposed*
-  Bike Routes
-  Pearce Airfield
-  Transmission Line Corridor



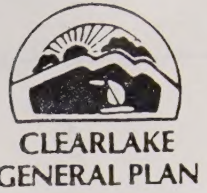



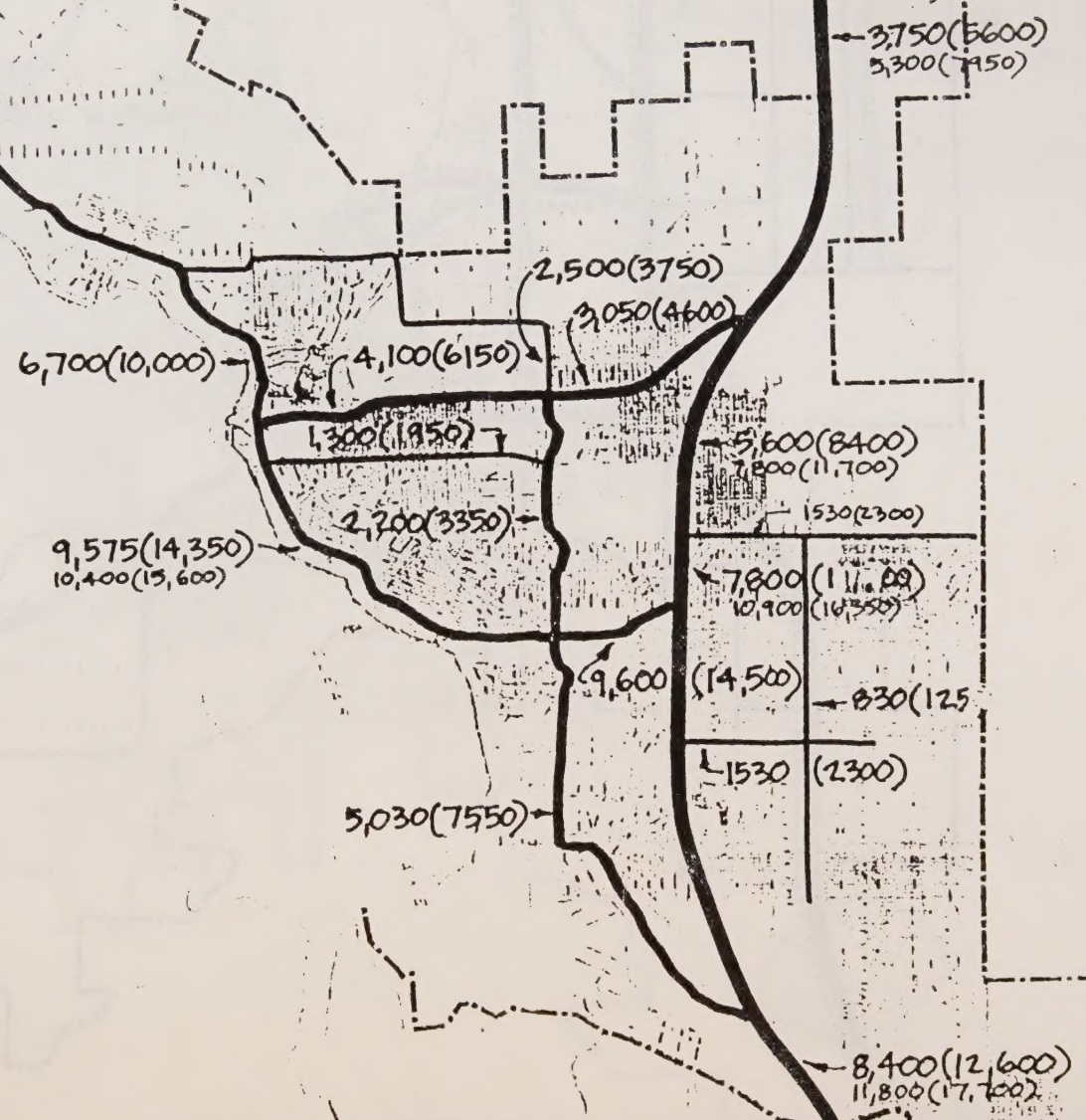


Figure 8

EXISTING
AND
FUTURE
TRAFFIC VOLUMES

114

-  State Highway 53
-  Arterial
-  Collector
- 2,500 1982 Volume*
- 7,800 Peak Period Volume
- (3750) 1992 Volume(proj.)



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